Issued September 24, 1913.

U. S. DEPARTMENT OF AGRICULTURE,

BUREAU OF SOILS—MILTON WHITNEY, Chief.

IN COOPERATION WITH THE GEORGIA STATE COLLEGE OF AGRICULTURE,
ANDREW M. SOULE, PRESIDENT; DAVID D. LONG, IN CHARGE
SOIL SURVEY.

SOIL SURVEY OF CHATTOOGA COUNTY, GEORGIA.

BY

A. W. MANGUM, OF THE U. S. DEPARTMENT OF AGRICULTURE,
AND DAVID D. LONG, OF THE GEORGIA STATE
COLLEGE OF AGRICULTURE.

HUGH H. BENNETT, INSPECTOR IN CHARGE SOUTHERN DIVISION.

[Advance Sheets—Field Operations of the Bureau of Soils, 1912.]

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1913.

BUREAU OF SOILS.

MILTON WHITNEY, *Chief of Bureau.*
ALBERT G. RICE, *Chief Clerk.*

SOIL SURVEY.

CURTIS F. MARBUT, *In Charge.*
G. W. BAUMANN, *Executive Assistant.*

COMMITTEE ON THE CORRELATION AND CLASSIFICATION OF SOILS.

CURTIS F. MARBUT, *Chairman.*
HUGH H. BENNETT, Inspector, Southern Division.
J. E. LAPHAM, Inspector, Northern Division.
MACY H. LAPHAM, Inspector, Western Division.
J. W. MCKERICHER, *Secretary.*

Issued September 24, 1913.

U. S. DEPARTMENT OF AGRICULTURE,

BUREAU OF SOILS—MILTON WHITNEY, Chief.

IN COOPERATION WITH THE GEORGIA STATE COLLEGE OF AGRICULTURE, ANDREW M. SOULE, PRESIDENT; DAVID D. LONG, IN CHARGE SOIL SURVEY.

SOIL SURVEY OF CHATTOOGA COUNTY, GEORGIA.

BY

A. W. MANGUM, OF THE U. S. DEPARTMENT OF AGRICULTURE, AND DAVID D. LONG, OF THE GEORGIA STATE COLLEGE OF AGRICULTURE.

HUGH H. BENNETT, INSPECTOR IN CHARGE SOUTHERN DIVISION.

[Advance Sheets—Field Operations of the Bureau of Soils, 1912.]

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1913.

LETTER OF TRANSMITTAL.

U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF SOILS,
Washington, D. C., April 1, 1913.

SIR: The accompanying report and soil map cover the survey of Chattooga County, Ga., one of the projects undertaken by the bureau during the field season of 1912. This work was done in cooperation with the Georgia State College of Agriculture, and the selection of this area was made after conference with State officials and at the urgent request of prominent citizens of the county, indorsed by the Hon. Gordon Lee, within whose district the area lies.

I have the honor to transmit herewith the manuscript report and map covering this area, and to recommend their publication as advance sheets of Field Operations of the Bureau of Soils for 1912, as provided by law.

Respectfully,

MILTON WHITNEY,
Chief of Bureau.

Hon. D. F. HOUSTON,
Secretary of Agriculture.

CONTENTS.

ILLUSTRATIONS.

PLATE.

FIGURE.

MAP.

Soil map, Chattooga County Sheet, Georgia.

SOIL SURVEY OF CHATTOOGA COUNTY, GEORGIA.

By A. W. MANGUM, of the U. S. Department of Agriculture, and DAVID D. LONG, of the Georgia State College of Agriculture.

DESCRIPTION OF AREA.

Chattooga County is situated in the northwestern part of the State of Georgia, and comprises a total area of 312 square miles, or 199,680 acres. It is bounded on the north by Walker County and on the south and east by Floyd County. The western boundary is

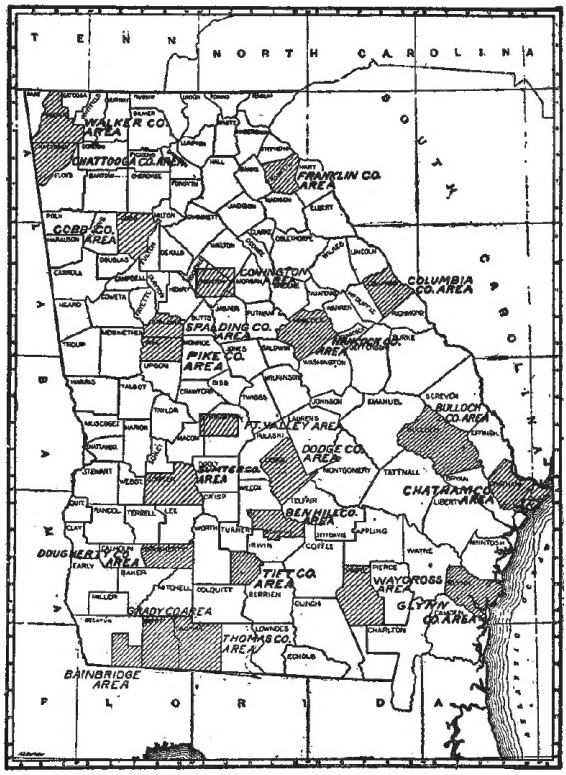


FIG. 1.—Sketch map showing areas surveyed in Georgia.

formed by the line between the States of Georgia and Alabama. The area surveyed embraces three major physiographic divisions: (1) The Cumberland Plateau, as represented by Lookout Mountain in the northwestern part of the county; (2) the Appalachian Ridges, comprising John Mountain, Little Sand Mountain, Taylor Ridge,

Simms Mountain, Kincaid Mountain, and Dirtseller Mountain, and (3) the Appalachian Valley, represented by the smooth valley areas.

Lookout Mountain, which covers an area of about 20 square miles in the northwestern part of the county, has a flat to gently rolling top and a steep, rocky escarpment along its eastern front facing the Broomtown Valley, which lies about 700 or 800 feet below the summit.

The summits of the Appalachian Ridges vary from 1,000 to about 1,500 feet above sea level and from 500 to 800 feet above the level of the adjacent valleys. In general the ridges are parallel, having a northeast to southwesterly trend, conformable to the escarpment of Lookout Mountain. With the exception of Dirtseller and Little Sand Mountains, they have sharp crests, with steep western slopes and relatively gentle eastern slopes.

Only the northern end of Dirtseller Mountain is within the limits of Chattooga County. From the vicinity of Fosters Store this mountain extends into Alabama about 4 miles to the southwest. It has an average width of about 1½ to 2 miles, and its summit, instead of being a sharp ridge, such as Taylor Ridge or John Mountain, is trough-shaped, with ridges on each side of a synclinal valley, which follows the center of the mountain in a southwesterly direction.

Taylor Ridge enters the county a little east of the middle of the northern boundary and extends in a southwesterly direction to the neighborhood of Anderson Store, where it swings back to the northeast, merging with Simms Mountain just east of Cheney.

Kincaid Mountain, in the southwestern part of the county, is a twin ridge, flaring out southward from its northern extremity just south of Holland to form roughly a V-shaped ridge, with sharp slopes on the east and west and more gentle inward slopes to the stream valley between the converging ridges.

The crests of Simms Mountain and John Mountain represent the eastern boundary of the county from the vicinity of Tulip to the northeastern corner of the area, with the exception of a gap southeast of Tidings. These are narrow, sharp-crested ridges with decidedly steep western slopes and more gentle slopes on the east, where erosion has brought about a succession of lateral ridges which in a general way run at right angles to the main ridges.

Little Sand Mountain is located in the northeastern part of the county, extending from near Tidings northeastwardly to the vicinity of Subligna. Its summit is flat to gently rolling, forming an extensive plateau bordered by steep, precipitous bluffs.

With the exception of this area and a few other occasional patches, such as those occurring on Dirtseller and Kincaid Mountains, the surface of the Appalachian Ridges is dominantly too steep and rough

to be suitable for the growing of crops which require a thorough cultivation of the soil, although a large part of these lands can be utilized for fruit growing where plowing is not always necessary.

The main valleys of the area are Broomtown Valley, between Lookout and Dirtseller Mountains, Chattooga Valley to the east, flanked on the east by Taylor Ridge and Kincaid Mountain and on the west by Dirtseller Mountain and a series of chert ridges; and Dirttown Valley, lying between Kincaid Mountain and Taylor Ridge on the west and Little Sand Mountain on the east, and following a general northeast to southwest direction from Tulip, to the north end of Little Sand Mountain, where it merges with Heywood Valley on the east and West Armuchee Valley on the west.

Heywood Valley and Dry Creek Valley include the narrow areas between Little Sand Mountain on the west and John Mountain on the east, and are separated by a series of low ridges. Only a small part of West Armuchee Valley lies within Chattooga County. This has its beginning near the northern county line, between Taylor Ridge and the isolated rounded mountain to the east. The surface configuration of the valleys varies from flat to undulating and gently rolling.

Associated with the valleys are several long chert ridges or successions of irregular chert hills, the general direction of which conforms with the direction followed by the main topographic divisions of the county. These ridges rarely rise to an elevation of more than 300 to 400 feet above the level of the adjacent valleys. The slopes, although frequently steep, are seldom too sharp to allow the cultivation of the land. The entire area occupied by the valleys is well suited to tillage operations, except in a few local patches which have been damaged by erosion.

A broad strip through the central part of the county is drained by the Chattooga River and its many small tributaries. This river enters the county a few miles west of the center of its northern boundary and flows in a southeasterly direction until it reaches a point a few miles southeast of Trion. It then follows a southwesterly course, traversing the entire length of the county and crossing into Alabama in the extreme southwestern part of the area. Its principal tributaries within Chattooga County are Chappel Creek, Raccoon Creek, and Teloga Creek. Many other small perennial streams, seldom more than a few miles in length, rise in the limestone hills and empty directly into the Chattooga River or into one of its principal tributaries. The extreme northwestern part of the county is drained by Little River, and the region east of Taylor Ridge is drained by the East Armuchee and West Armuchee Creeks and their small tributaries.

Chattooga County was originally a part of Cherokee County, which was established about 1835, when a treaty was made with the Cherokee Indians whereby they relinquished all claims to a large area in the northwestern part of Georgia. Cherokee County was later divided into a number of counties, and in 1838 Chattooga County was formed from parts of Floyd and Walker Counties.

Prior to the treaty of 1835 there were very few white settlers in the area, but after the land was released by the Indians the population increased steadily, the majority of the settlers coming from North Carolina and South Carolina. There has been little or no immigration of foreigners, and the present population, which the 1910 census gives as 13,608, consists mainly of the descendants of the early settlers of this or adjoining counties. At the present time many of the larger valleys, such as the Broomtown, Dirttown, and Chattooga Valleys, are comparatively thickly settled. The low, gravelly ridges are still sparsely settled, while many of the high ridges, such as Taylor Ridge and John Mountain, where the land is rough and of little agricultural value, are almost uninhabited. The more level mountainous areas, such as those found on the summits of Lookout, Little Sand, Dirtseller, and Kincaid Mountains are gradually being settled and developed agriculturally, but at present they are very sparsely settled.

The principal towns within the county are Summerville, the county seat, which is located near the geographical center of the county and has 657 inhabitants; Lyerly, a town of about 322 inhabitants, located in the south-central part of the county; Trion, a manufacturing town of 1,721 inhabitants, located in the north-central part of the area; and Menlo, with a population of about 376, located in the extreme western part of the county. Chelsea and Gore are also shipping points of local importance.

The transportation facilities furnished by the railroads are good, and with the exception of the extreme northeastern corner every part of the county is within easy reach of some local shipping point on one of the railroads.

A branch of the Central of Georgia Railway, extending from Chattanooga, Tenn., to Griffin, Ga., traverses the central part of the county from its northern to its southern boundary, passing through Trion, Summerville, Lyerly, and several small stations used as local shipping points. A short branch of this road, known as the "Lyerly Switch," extends several miles southwest of Lyerly and is of considerable local importance, especially during the season for marketing the peaches grown in the locality.

The transportation facilities for the region east of Taylor Ridge are furnished by the Rome & Northern Railroad, which extends from Gore, located in the east-central part of the county, to Rome, Ga. The Tennessee, Alabama & Georgia Railroad, extending from Chattanooga, Tenn., to Gadsden, Ala., crosses the extreme western part of the county, passing through Menlo and several smaller stations within the area.

The public roads throughout the entire county are not in the best of repair. The cherty material, which occurs in ridges in every part of the county, furnishes an abundant supply of excellent road building material, but with the exception of a few of the main roads between some of the principal towns little attention is given to road improvement.

Most of the farm products not sold in the local markets at Summerville, Trion, or Lyerly are marketed at Rome, Ga., which is located in Floyd County, just southeast of the area surveyed. The peaches grown in the county are crated and shipped in carload lots to New York and other large northern markets. The products of the canneries operated by the owners of the larger peach orchards are sold in the cities of Georgia and of the northern and western States.

CLIMATE.

The mild winters and long growing season make the climate of the county suitable for the growing of a wide variety of crops. The summers are long and are seldom excessively hot, with the exception of a few short periods during July or August, when the temperature sometimes rises above 90° F. The winters are short, and severe freezes do not ordinarily occur except during the months of January and February, and even then the ground seldom freezes to a depth of more than 4 to 6 inches. Owing to their altitude, the cultivated areas occupying the higher mountains and ridges have cool nights in the early fall and late spring, which make the cotton crop uncertain.

The county as a whole lies near the northern limit of profitable cotton production in this general region. The periods of warm weather which sometimes occur in the late winter or early spring occasionally cause the fruit trees to bud prematurely, resulting in the subsequent loss of the crop or its serious injury by cold weather.

The following table, compiled from records of the Weather Bureau at Adairsville, Bartow County, just southeast of Chattooga County,

shows the normal monthly and annual temperature and precipitation and the date of the earliest and latest killing frosts:

Normal monthly, seasonal, and annual temperature and precipitation at Adairsville.

Month.	Temperature.			Precipitation.			
	Mean.	Absolute maximum.	Absolute minimum.	Mean.	Total amount for the driest year.	Total amount for the wettest year.	Snow, average depth.
	°F.	°F.	°F.	Inches.	Inches.	Inches.	Inches.
December	41	69	5	4.4	1.2	4.4	0.3
January	40	73	−1	4.5	3.6	3.5	1.3
February	41	77	−8	5.9	3.7	6.9	1.6
Winter	41			14.8	8.5	14.8	3.2
March	53	84	6	6.0	2.7	7.1	T.
April	59	92	30	3.6	1.6	6.6	0.0
May	70	94	38	3.1	3.2	4.3	0.0
Spring	61			12.7	7.5	18.8	T.
June	76	99	41	3.8	1.3	10.8	0.0
July	79	102	56	4.1	6.2	4.6	0.0
August	78	99	55	4.0	2.4	1.1	0.0
Summer	78			11.9	9.9	16.5	0.0
September	72	97	40	3.4	4.7	4.7	0.0
October	61	88	26	2.3	1.0	5.2	T.
November	50	77	19	2.5	4.3	3.4	T.
Fall	61			8.2	10.0	13.3	T.
Year	60	102	−8	47.6	35.9	62.6	3.2

Average date of first killing frost in autumn, Oct. 31; of last in spring, Apr. 3. Earliest date of killing rost in autumn, Oct. 15; latest in spring, Apr. 24.

AGRICULTURE.

The territory now embraced within the limits of Chattooga County has depended upon agriculture as its chief resource since the earliest days of its development. Traces of agriculture were left by the Cherokee Indians in Broomtown and Dirttown Valleys in the form of small open spaces which were used for producing corn and beans.

The first white people to enter the territory were traders, who were followed during the latter part of the eighteenth century by a few settlers. The first important settlements were made in Chattooga, Broomtown, and Dirttown Valleys by immigrants from south and middle Georgia and the Carolinas, a considerable number arriving about 1820. The settlers brought with them live stock, which was allowed to pasture on the open range. A considerable number of sheep were raised, the settlers depending upon the wool for clothing.

Wheat was one of the most important early crops. Small quantities of barley and rye were grown, and some buckwheat.

The valley lands of the county were the first to be cleared and settled, the ridges remaining to be utilized in an important way only within the last 20 years. The original forest of the valleys, consisting mainly of pine, white, black, and Spanish oak, hickory, poplar, and sycamore, was at first deadened and later burned off to clear the land.

Savannah was the nearest trading point about 1800. At a later date products for market were sent to Ringgold, then to Chattanooga, and finally to Rome. In 1830 the town of Summerville was established and assumed importance through the raising of thoroughbred horses for racing purposes. Some excellent stock was introduced, including the Glenco and Morgan breeds, and through this industry many settlers were attracted from Kentucky and Tennessee.

In 1840 settlers from the North Carolina tobacco district came for the purpose of growing tobacco in this section. Owing to the apparent similarity of the soils found in Chattooga County to those of North Carolina it was thought that similar grades of tobacco could be grown here. The soils selected for this purpose failed to produce satisfactory tobacco crops, so that this industry was abandoned in favor of the cultivation of more profitable general farm crops, to which the soils are better adapted.

Cotton entered into the agriculture of the county soon after 1847. The opening of the first cotton mill at Trion provided a market for this crop. A very small amount of cotton was grown at first, the crop not assuming extensive proportions until after the Civil War.

Agriculture has shown a gradual development from the beginning. The lack of transportation facilities and the great distance from markets confined the general trend of operations to those lines insuring self-sustenance for the farmers until about 1860. In 1889 the transportation situation was relieved by the opening of the railroad now known as Central of Georgia Branch Line.

The varied soils and favorable climate of the county permit the production of a wide range of crops. The chief crops grown are cotton, corn, oats, a small amount of wheat, cowpeas, sorghum for sirup, and hay, sweet potatoes, peaches, and strawberries, besides the many vegetables grown in the home gardens.

Cotton is the most important money crop of the county. In point of cultivated acreage, however, it stands second to the corn crop. The acreage devoted to cotton during the last 40 years has fluctuated between 13,000 and 19,500 acres, while the annual yield has ranged from 5,000 to 10,634 bales of 500 pounds. In 1908 one of the largest crops was produced, the production of 10.634 bales of 500 pounds

being reported. According to the census of 1910, 19,472 acres of cotton yielded 7,567 bales in 1909, or an average of 0.39 bale per acre. This average yield per acre is slightly below that for the 30 years preceding.

The best yields of cotton are secured on the valley lands, particularly from the Hagerstown silt loam and Decatur clay loam types of soil. The production varies widely, however, owing to the differences in preparation of the land, the varieties grown, cultural methods, and the fertilization practiced on the various individual farms. The average valley lands can generally be made to produce from 100 to 150 per cent more than the ridge soils. By more careful handling of the crop a yield of one-half to 1 bale or more per acre should be the average throughout the valleys of the county.

The preparation of the soil for cotton usually consists of "breaking" or plowing the land broadcast, after which it is harrowed and leveled. The use of two-horse plows and disk plows is coming into general favor for this purpose. The rows are laid off by plowing out furrows, which receive the fertilizer. A bed, from 3 to 6 inches in height, is then turned over the fertilizer, and the cotton planted on this bed. The tendency is to practice nearly level cultivation. The cotton rows are laid off from 3 to 6 feet apart, depending upon the type of soil, productiveness of the individual fields, and the fertilization given. On the poorer ridge soils or impoverished valley lands they are about 3 feet apart. On the stronger, more productive soils and those lands to which liberal amounts of commercial fertilizers or stable manure are applied rows are run 6 feet apart. The distance between the plants in the drill varies from 10 to 20 inches, generally being greater on the more productive soil types. In many cases it would be advisable to have more space between the plants, the prevailing tendency being toward crowding the stalks.

The cultivation of the crop begins as soon as the young plants are well above the ground by "barring off," which consists of running close to the rows with a small plow and turning the soil toward the middle of rows, thereby covering up the grass between the rows and leaving the cotton on a narrow ridge. This facilitates the thinning process, chopping out with hoes, which immediately follows. The cotton is cultivated with scrapes and cultivators, the latter being more popular for this purpose. The best farmers cultivate the cotton from 5 to 10 times before it is "laid by," although many farmers give but three or four cultivations. The tillage of the crop is discontinued about the latter part of July.

There is a wide range in the quality, quantity, and time of application of commercial fertilizers for the cotton crop. The formulas vary from 8–2–2 [1] to 12–2–4. The first formula is in common use,

[1] Eight per cent phosphoric acid, 2 per cent nitrogen, and 2 per cent potash.

although grades of 9–2–2 and 10–2–3 are used extensively. From 200 pounds to 800 pounds are applied to an acre, the average being in the neighborhood of 385 pounds. A little over half of the fertilizer is applied to the bed before or at the time of planting, and the remainder is distributed around the plants at about the second cultivation. Many farmers bed on the entire amount before planting, while a few bed on only a small amount and apply a part of the remainder at the time of planting and a part at the second or third cultivation, making three applications in all.

Several varieties of cotton are grown. General practice has demonstrated that certain varieties are better adapted to some soils than to others. On the soils of the valleys the small-boll varieties are used, as they mature earlier and do not produce so rank a growth as the big-boll varieties. Of the varieties used on the valley soils the most common is the Kings Improved. The Dickson Improved and Broadwell Double Jointed are found very satisfactory for the Hagerstown silt loam, the Decatur clay loam, and the Conasauga silt loam. On the gravel ridges the big-boll varieties are more productive than the small-boll varieties. For these gravelly and other ridge soils the Cleveland Big-Boll variety is the favorite, with the Russel Big-Boll second in importance. Cooks Improved, Mortgage Lifter, and other varieties are also planted to a greater or less extent throughout the county. The big-boll varieties are often grown where it is recognized that the small-boll varieties would be more productive, partly because of the greater ease in gathering the cotton from the large bolls.

The acreage of corn is greater than that of any other crop in the county. For the last 40 years there has been approximately 20,000 acres devoted to this crop. The 1910 census reports an acreage of 19,770 acres in 1909, a decrease of 2,533 acres from that of 1899. The average yield per acre as reported by the census was 15.2 bushels in 1899 and 12.2 bushels in 1909. The better farmers average about 25 to 30 bushels per acre, while 80 to 100 bushels have been produced.

The general method of preparing the seed bed is the same as for cotton. The rows are laid off from 4 to 6 feet apart, and the corn is planted from about 2 to 3½ feet apart in the row. Level cultivation is practiced, except on low lands where the crop is planted on beds. By decreasing the distance between the hills and by using commercial fertilizer, or preferably heavy applications of stable manure, the yield could be increased considerably. Corn is cultivated less intensively than cotton; where the cotton crop receives from six to ten cultivations, the corn crop receives but three or four. In view of the high price of corn during recent years it would be decidedly profitable to increase the yield by more careful soil management.

During the month of August the leaves of the corn stalks are frequently pulled and tied into bundles for fodder, but this practice is gradually yielding to that of allowing the leaves to remain, and cutting and shocking stalks in November. The corn is then pulled from the stalks, which are fed to the stock.

Many farmers do not use any commercial fertilizer or stable manure for this crop, while others apply only a small amount of stable manure or 100 to 200 pounds of low-grade fertilizers. A liberal use of a 10–2–3 fertilizer in two or three applications has proven beneficial. The same grade of fertilizer material is used as for cotton. A few farmers have practically abandoned the use of fertilizers, employing better methods of cultivation, seed selection, and crop rotations, including cowpeas, with the result that the yields have been increased considerably.

The Marlboro, Hastings, and Shaw varieties are used to a considerable extent, although in many cases the varieties have become so mixed that the corn has lost its characteristic features. Several farmers have been selecting seed, applying their own names to the varieties produced.

The total area devoted to the production of oats in 1909, according to the census, comprised 1,865 acres, representing an increase of 170 acres over the acreage of 1899 and a decrease of 4,231 acres from that of 1889. Oats constituted an important crop until about 1890, when it was largely displaced by cotton. At the present time the acreage is increasing on account of the greater yields brought about by crop rotation, including cowpeas. The average acreage yield for the county in 1909 was 11.4 bushels, an increase of 3.7 bushels over that of 1899. The yield ranges from 7 to 60 bushels per acre at present, the better methods producing between 25 and 60 bushels.

The old method of sowing the oats broadcast and then plowing them under without harrowing, thereby leaving the surface rough and poorly prepared, is giving way to better practices. The land should be broken thoroughly and a smooth seed bed of fine tilth prepared by harrowing several times, the seed to be drilled in and the fertilizer applied at the same time. This method has given the best results and should be employed more extensively. When oats follow a cultivated crop, as corn or cowpeas, the land is generally prepared thoroughly with disk harrows before seeding. An open-furrow method is successfully practiced by some, the crop being seeded between rows of cotton in deep furrows but with only a shallow covering.

The best time for seeding oats is during October, although much of the seeding takes place during the early winter. Early sowing insures sufficient growth to resist the effects of winter freezing. In

many instances late-sown crops have been completely lost. Spring oats are generally sown in March.

The crop is sometimes cut green for hay. When used for this purpose, it would be well to seed a mixture of oats and vetch. The crop is harvested with the reaper or with the cradle. Most of the crop is thrashed, while a part is fed on the farm without thrashing. Oats constitute a valuable winter cover crop.

Fertilizers for oats are generally of the same grade as those used for cotton or corn. Generally the acreage application is about 200 pounds. A dressing of sodium nitrate would be beneficial in the spring, when the crop has a yellowish-green color and is apparently not very promising. This should be applied broadcast at the rate of 100 pounds per acre.

The most productive soils for oats are the Conasauga, Armuchee, Huntington, Colbert, and Hagerstown series of the valley lands. The low flat areas are well suited to the crop. On the gravel ridges oats give poor returns, except on newly cleared land.

For fall seeding the Appler variety is in most common use, as it is apparently free from rust and is the most productive. The Red Rustproof and the Texas Rustproof are also used. For spring seeding the Burt is the most common variety.

Cowpeas are grown both for seed and forage. They are either planted between the corn rows at the last cultivation or sown broadcast. They produce an abundance of seed and an excellent growth of vine for forage purposes. They can be grown on all the soils of the county with beneficial results. The use of cowpeas sown broadcast for hay is recommended, and the practice should be extended. The vines, together with the crab grass which comes in with them, make nutritious hay, which brings a good price. The yields of this hay range from one-half ton to 2 tons per acre, the higher yields being secured from the Huntington silt loam. As a soil renovator, the use of cowpeas can not be too strongly urged. For pasturage for hogs this crop is excellent. The Unknown, Whippoorwill, Iron, and Crowder varieties are most extensively used. Other varieties are also grown. No fertilizers are used with this crop.

The production of wheat has steadily decreased during the last 40 years. According to the 1910 census, only 587 acres were devoted to this crop in 1909. In 1899 wheat was grown on 3,935 acres, and in 1879 on 7,930 acres. The low yields of wheat and the increased price of cotton seem to have driven wheat from its place in the agriculture of the county. A few farmers, however, are again taking up wheat production. The chief difficulty with the crop seems to be that the plants do not stool properly, and the ripened heads are short and produce but few well-developed grains. The grains in the upper and

lower portions of the heads are often shriveled, while the spikelets bear but one grain instead of three.

These unfavorable tendencies are probably connected with too continuous cropping to the one crop, with accompanying reduction of the humus supply in the soil. By turning under a good crop of cowpeas to supply organic matter and by deep plowing and subsoiling this condition could be improved. The same types of soil as are found in the valleys of the county, particularly the limestone soils, produce good yields of wheat in other parts of the United States, especially where the crops are rotated and large quantities of stable manure and cowpeas are plowed under. After plowing under a heavy cover of vegetation, such as cowpeas, the land should be harrowed until a good tilth is secured. The wheat should be sown during the latter part of October with a grain drill, and about 400 pounds per acre of a 10–4–5 fertilizer applied at the time of seeding. From 1 to 1½ bushels of good seed should be sown per acre, at least until the soil is sufficiently enriched with organic matter to make the plants stool well. The crop may also be pastured lightly during the winter months.

Rye is grown to a limited extent. For a winter cover crop to prevent erosion the crop gives good results and should be much more generally used. Rye also affords good winter and early spring pasturage, either when grown by itself or in combination with vetch. A mixture of rye and vetch gives good yields of hay if cut while the grain is in the milk stage. Rye can also be used advantageously as a means of supplying organic matter to the soil by plowing under in the spring.

This crop should be seeded at the same time and in the same manner as wheat.

For winter roughage the greater number of farmers depend upon corn fodder and cottonseed hulls. The more prosperous farmers feed other crops, such as pea-vine and crab-grass hay. Herd's grass (redtop) is grown to some extent, and yields from one-half to 1 ton of hay per acre, giving good results on the poorly drained soils. Sorghum is frequently sown broadcast and cut for forage before the stalks become too hard. It is also grown for sirup. The yields of this forage vary from three-fourths ton to 2½ tons per acre. Wild grasses are used for hay and grazing in a limited way.

For hay and pasturage, more red, white, and alsike clover should be sown. Lespedeza or Japan clover (locally called wild clover) grows wild and affords good grazing. Mixed redtop and tall meadow oat grass produce good yields of a very fair hay.

A vegetable garden is made on almost every farm. The average farm produces scarcely enough Irish potatoes for home use. This crop can be successfully grown on a number of soil types, especially the silt loam, loam, and gravelly loam soils. The Lookout potato

PEACH ORCHARD NEAR SUMMERVILLE.

has been propagated on Lookout Mountain in this county. This variety is noted for its good keeping qualities and flavor after having been stored for some time, and finds a ready sale when placed on the market. Sweet potatoes, onions, beans, peas, turnips, and sweet corn are grown for home use.

Peaches have been grown in the county since its settlement (see Pl. I). Between 1850 and 1870 the production of peaches for the manufacture of brandy became an important industry. The commercial production of peaches for market began in 1897–98 with the planting of 100 acres near Menlo. The industry was stimulated by interested northern capitalists who bought large tracts of land for use in peach production. In 1899 it is estimated that from 10,000 to 15,000 acres of trees were set out, the orchards ranging in size from about 50 to 400 acres or more. The industry reached its highest point between 1904 and 1906, but at that time the entire acreage planted in 1899 came into bearing and the overabundance of fruit could not be disposed of on account of unpreparedness for handling the crop. Hundreds of carloads of peaches were dumped at the sidings, the railroad companies being unable to transport them. Since then the industry has decreased in importance, until at present only about 1,000 acres are in orchards. This decline of peach growing has resulted from scarcity of labor as well as from inadequate transportation facilities. The low price secured also discouraged many farmers, and as a consequence many of the orchards have been cut down and the land devoted to general farming. In many instances crop losses were due to the failure to spray and prune properly and to inadequate cultivation.

For peaches the Clarksville gravelly loam, locally known as "gray gravelly land," was chosen, the eastern slopes being considered most desirable. The Hanceville fine sandy loam as found on Dirtseller and Kincaid Mountains was also utilized for peaches. Although both of these soils are well adapted to peaches, the Hanceville fine sandy loam produces a more highly colored fruit of larger size and better shipping quality. Several other types are very well suited to the crop, as indicated in the following pages under the soil type descriptions.

The cultural methods employed at the beginning of the industry consisted of scarcely more than the planting of the trees. The orchards which successfully passed through the depression period are those which were cultivated, sprayed, and pruned. To-day the industry is meeting with greater success.

Since the beginning of the industry an average of two crops in three years has been secured. Abnormally warm weather during the winter and early spring, followed by periods of freezing, have

been the chief cause of crop failures. The use of artificial heat in the orchards during unseasonable weather has not been tried. It would seem that the average losses could be reduced by some plan of heating, following the methods employed in orchards of citrus fruits.

Of the peaches grown, 90 per cent are Elbertas. The Emma, Georgia Belle, and Carmen are also successful varieties. A few Sneed and Triumph trees have been tried without success. The Carmen is the earliest variety, being ready for market the latter part of June or the early part of July. It is fairly productive, and the fruit is of good flavor, but has poor shipping qualities. The Elberta and Georgia Belle are the most profitable varieties. These are shipped about the latter part of July.

Peaches are packed in 4-quart baskets, six of which fill a crate. The yields vary from 100 to 150 or more crates per acre. The crop is handled by labor which is brought in from the surrounding country. A large part of the crop is allowed to become overripe and is lost. Several canning factories have been established to handle the peaches which can not be shipped.

Of the many special crops to which the soils of the county are adapted, strawberries occupy a place second only to that of peaches. The growing of strawberries for shipping purposes was begun in 1900, when a total area of about 500 acres was devoted to their production, the low price of cotton at that time having caused the farmers to turn their attention to other crops. The industry attained its greatest development in 1903, when 800 to 1,000 acres were devoted to the strawberry crop. Since 1903 the acreage has steadily decreased, on account of the higher prices of cotton and scarcity of labor. The acreage fluctuates from year to year inversely with the price of cotton.

The bulk of the crop is grown in the vicinity of Summerville, Berryton, and Menlo. The crop is confined almost entirely to the Clarksville gravelly loam, which is especially adapted to strawberries, being the earliest soil in the county on account of the ridge topography and porous nature of soil and subsoil. The early warming up of the soil starts the plants and buds early in the spring. The berries produced on this land have a good flavor and color and good shipping qualities. On the east and southeast exposures the berries are said to mature earlier, to attain a larger size, and to have a superior quality.

In growing strawberries the general practice is to break the land 4 to 6 inches deep. Thorough preparation of the soil, including not only deep plowing but repeated harrowing, is advisable before setting. It is preferable to have the rows not less than 4 feet apart and the plants about 18 inches apart in each row. The plants are set during the month of November and cultivated the first year. The buds are

pinched off and the plants not allowed to fruit the first season. One-horse cultivators or "dixie" plows are used for the cultivation. Many growers have kept the plants thinned by either pulling or hoeing out the surplus runners, while others employ the matted-row system, which is coming into general favor because less expensive.

After the berries are gathered the vines are cultivated during the spring and summer and thinned out. The matted rows are never allowed to become more than 8 or 9 inches in width. The fields produce profitable crops for 3 to 5 years, after which the plants are plowed up and the fields devoted to the general farm crops for a period of 3 years before they are again set to strawberries.

The leading varieties are the Lady Thompson, Klondike, and Early Michael. The Early Michael is the earliest bearing variety, the berries being ready for shipment usually during the first 10 days of May. This is a large variety of good flavor, but having poor shipping qualities. The Lady Thompson is most extensively grown, as it is very productive and is especially sweet. The Klondike is less productive than the Lady Thompson, but has a better color and better shipping qualities and brings the higher price. The Louise has been tried, but the fruit proved unable to stand shipment, and its production was soon abandoned. The Klondike and Lady Thompson are ready for marketing about the latter part of May.

The chief and in some cases the only fertilizer used is sodium nitrate. This is supplied at the rate of about 100 pounds per acre, three applications being made as the berries advance toward maturity. Applications of 250 to 500 pounds per acre of potassium fertilizers produce a berry of especially firm quality, large size, and bright color. Before setting it is advisable to turn under a heavy crop of cowpeas to supply humus and also nitrogen, which is the most expensive fertilizer ingredient needed. The time of applying fertilizers depends upon the end in view. If only plants are desired the first year, the fertilizer should be applied in the winter, while if berries are desired it should be applied in the spring following the setting.

The berries are picked by women and children and are packed in quart baskets. Twenty-four quarts constitute a crate. The yields range from 10 to 50 crates or more per acre, depending upon cultural methods. The largest crop is secured the second year.

The berries are shipped by express if in small quantities, while large consignments are shipped in refrigerator cars. The growers generally cooperate in filling the cars. A large part of the crop is shipped to commission houses, although the practice of selling f. o. b. direct to the buyers is more satisfactory.

The stock-raising and dairying industries have never approached the importance which the land of the county warrants. According to the census of 1910 the total value of domestic animals amounted

to $449,386 in 1909, an increase of $167,100 over the value reported by the preceding census. The number of domestic animals on farms is very small. In 1899, according to the 1900 census, there were on the 1,625 farms of the county 1,179 horses, 1,685 mules, 2,195 sheep, 9,091 hogs, and 5,698 neat cattle. The dairy products at that time were correspondingly low, the value of all dairy products being $45,308, of which the quantity sold amounted to $5,857.

The farmers are gradually becoming more interested in stock production. The breeds of cattle which are finding favor for dairying purposes are the Holstein and Jersey. There are a few registered herds in the county. Better breeds of beef cattle should be introduced.

The fever tick has discouraged stock raising, causing considerable loss and restricting the market outlets. Indifference in the prevention of diseases, such as tick fever and hog cholera, has had much to do with retarding the industry. Dipping vats should be installed for eradicating the tick. Efforts are being made by the U. S. Department of Agriculture to eliminate this pest.[1]

With its extensive areas of good pasture and forage-crop lands, together with good transportation facilities, Chattooga County should be one of the leading stock-raising and dairying counties of the State. The Hagerstown silt loam and Decatur clay loam types of soil are especially adapted to dairying and stock raising, being heavy producers of grass and forage crops. These types are profitably used for like purposes in the Appalachian Valley region to the north. Through the use of silos sufficient succulent food can be stored for winter use in maintaining dairy herds. With an extension of these industries, more manure will be produced for building up impoverished fields, and agriculture in general will be diversified in a profitable way.

On the average farm throughout the county one or two milch cows are kept to supply home needs. A large number of the tenants, especially negroes, do not possess even one cow. Before the enactment of the present stock law many more cattle were owned by tenants, grazing on the open range being permissible. Such cattle, however, were of low grade. Since the stock law came into effect the cattle have been improved by better care, feeding, and the selection of better breeds. The same is true with respect to hogs, as the common "ridge rooters" of the open-range period have given way to better breeds.

Systematic crop rotations are not generally followed, although the best farmers recognize their value and are putting efficient rotations into practice. Many fields have been successively planted to cotton

[1] See Farmers' Bulletin No. 258.

or corn for the last 40 years, commercial fertilizers having been used to avoid the decrease in yields which naturally follows such hard usage of the land. Some farmers attempt a rotation by changing from cotton to corn every few years. Others follow cotton with corn, then oats. After the land is run down, the fields, too, generally are "rested" by allowing them to remain uncultivated, a method contrary to the better plan of farming under which land is properly rested by changing the crop. If the field has been in clean cultivation, it should be next used for some seeded crop, such as oats, rye, wheat, or cowpeas.

No crop rotation is complete unless it contains a legume, such as cowpeas, clover, or vetch. The past system of cropping has so depleted the organic matter of the soils of many fields that it is imperative to use green manuring crops to renew their productiveness. The burning of the stalks of corn, cotton, and other vegetable refuse has assisted in the reduction of the humus content. All organic matter should be turned under as soon as possible in the fall and allowed to decompose.

A good rotation would consist of cotton the first year, corn, with cowpeas planted between the rows, the second year, and small grain, as oats or wheat, the third year, followed by cowpeas for hay or to be plowed under. This rotation is only suggestive; each farmer must work out a system of crop succession suited to the needs of the soils of his particular farm and to his general plan of agriculture.

Expenditures for fertilizers have more than doubled during the last 10 years, the amount, according to the last census, being $51,310 for the year 1909. Very few farmers mix the fertilizers at home, a method thoroughly in keeping with the better systems of agriculture. Cotton seed, acid phosphates, kainit, and other fertilizer ingredients can be easily mixed on the farm to meet the requirements of the various soils and crops.

More phosphoric acid should be used in the mixtures, especially for cotton grown on cold-natured, late soils, in order to hasten maturity. On Lookout Mountain such mixtures are especially advantageous on account of the higher altitude and consequent danger of the late crop being killed by frost. Lime is needed by nearly all of the soils of the county, not only to correct acidity but also to improve the physical condition of the land.

Seed selection is not practiced in an important way, notwithstanding the fact that certain varieties are better adapted to particular soils than to others. A few farmers are selecting seed corn in an effort to adjust the variety to local conditions of soil, climate, etc. Early maturing varieties of cotton are desired, and accordingly seed from the earliest maturing plants should be selected, providing that the plants are free from disease, productive, and vigorous in growth.

In general, seed should be selected from the most productive, vigorous, and healthy plants of each crop.

The preparation of a good seed bed is necessary to the production of a successful crop. For this purpose the breaking of the land should be deep and thorough. The depth of plowing should be gradually increased from year to year until a depth of 10 to 12 inches or more is reached. By successively turning up an inch or so of the raw subsurface soil or subsoil so as to expose the material to the beneficial action of frost and freezes, a good, productive, deep seed bed can be worked up. Subsoiling is needed in many fields where the subsoil or subsurface is compact and resistant to proper root development. In addition to remedying this defect, subsoiling opens up the ground so as to permit the proper circulation of air and moisture. The aim of cultivating crops should be to conserve moisture as well as to check the growth of weeds and grass. By frequent shallow cultivation, especially during periods of drought, a soil mulch may be formed which will prevent the rapid evaporation of moisture. Surface crusts formed by rains should be broken up as soon as possible.

Improved farm implements are gradually being introduced, and as a result better methods of soil management are being practiced. For breaking the land, disk and two-horse turning plows are being used in place of the one-horse "dixie." Subsoil plows are also being used by a few farmers. Among the cultivators used are the disk and plow cultivator, riding cultivator, and the ordinary weeder. The stalk cutter has been introduced within the last 3 years and its use has been beneficial in increasing the organic-matter content of the soil, since before its advent the stalks were raked together and burned.

The number of farms operated by the owners is generally decreasing. According to the census figures, the decrease from 1899 to 1909 has been 1 per cent. The decrease of owners operating their farms is accompanied by a decrease in the fertility of the soil, as the systems of land tenure employed in the county are not conducive to the betterment of soil conditions. The tenants attempt to get from the soil all that is possible and very seldom employ a system of farming which does not leave the soil impoverished. Longer leases should be made, and in the lease a system of farming so arranged as to increase rather than decrease the fertility of the farm should be specified.

At present there are two predominating systems of land tenure. When the landowner furnishes all tools, stock, and feed he receives one-half of all the products. Under the second system the landlord furnishes only the land, and receives one-third of all crops except cotton and cotton seed, of which he receives one-fourth. The landowner in both cases furnishes fertilizers in proportion to his share of

the crop. The tenant receives all firewood and pasture needed free. There is no standard amount for cash rental, the rent being influenced by the quality of the land. River-bottom and valley lands rent for 50 cents to $5 an acre, depending upon improvements. The Clarksville gravelly loam and other ridge lands rent from 50 cents to $2.50 per acre. Pasture is rented at the rate of 50 cents to $1 per animal during the grass season, from April to December. The leases are for one year.

According to the census figures, the cash expenditure for labor in 1909 amounted to $47,344, an increase of $27,434 over that expended in 1899 in this county. Labor can be said to be neither scarce nor plentiful. Many of the farmers depend upon the assistance of their families for such work as hoeing and picking cotton. Laborers are secured for ordinary farm work at 50 to 75 cents a day; during harvest they are paid $1 a day. Cotton is picked at standard rates of 50 to 75 cents per 100 pounds of seed cotton. By the month farm hands receive $10 to $30, with their board.

According to the census of 1910 there were 154,662 acres in farms in 1909, with 72,658 acres classed as improved. The average size of the farms is about 83.4 acres, of which an average of 39.2 acres is improved.[1]

Agriculture is well established, and in the light of present tendencies Chattooga County bids fair to become one of the leading agricultural counties of the State. The advancement to be made lies in the direction of a greater diversification of crops, the practice of crop rotations, including the growing of cowpeas and other humus and nitrogen supplying crops, the raising of more and better stock, seed selection, the home mixing of fertilizers, the use of labor-saving tools, and the application of lime to the acid soils.

SOILS.

Chattooga County embraces a wide range of soils suited to the maintenance of a diversified, permanent, and profitable agriculture. Its soils are variously adapted to the production of general farm crops and special crops, such as fruits, potatoes, strawberries, and cantaloupes. The value and adaptation of the different types varies considerably, owing to differences in the character of the material, as determined by origin and degree of weathering; the texture or relative amount of the different-sized particles, such as clay, sand, and silt; the structure or degree of compactness, friability, and plasticity; and the topography and drainage conditions.

The upland soils are entirely residual in origin, representing the products of decay and formed by the weathering of sandstones, shales,

[1] The census tabulates each tenancy as a farm. The average size of holdings is therefore considerably larger than the acreage stated.

pure limestones, and cherty limestones. Local areas are more or less modified by colluvial material, representing soils moved from higher to lower positions by running water. The bottom-land soils represent alluvial material washed from the upland soils of the drainage basins and deposited over the flood plains of the various streams by overflow waters.

The upland soils have been divided into groups or series of soils, including one or more types having a common origin and similar characteristics of color, structure, and topography, but differing, when the group includes more than one type, in texture.

The rocks giving rise to the soils are all sedimentary in origin. The materials constituting the rocks were deposited in water ages ago and subsequently consolidated. Since their uplift above water, they have undergone disintegration and decomposition under the influence of weathering agencies.

Geologically, the rocks of the area vary in age. The Cambrian, Silurian, Devonian, and Carboniferous periods are represented by various formations, including the Rome, Conasauga, Knox dolomite, Chickamauga, Rockwood, Armuchee chert, Chattooga shale, Fort Payne, Floyd, Bangor, Walden, and Lookout formations.[1]

The Conasauga series includes light-brown silty soils having yellow silty clay loam to silty clay subsoils. The material is derived entirely from thin shales of the Canasauga formation and the soils occupy flat valley lands. They are naturally rather low in productivity. The series is represented by a single type, the Conasauga silt loam.

The Armuchee series is related to the Conasauga in point of origin, a considerable proportion of the component material being derived from shales. These are brownish to red soils, underlain by red clay. They are derived from thin and thick shales interstratified with fine-grained sandstone and a dark-colored, flintlike, cherty shale. The presence of chert fragments in many localities indicates that the soils in places include some material derived from limestone. These rocks largely belong in the Floyd formation. That portion of the silt loam lying to the west of Taylor Ridge has been derived from rocks of the Conasauga formation. The group is represented by three types—the silt loam, clay loam, and loam. Topographically, these vary from flat valley lands to low, gently rolling ridges. They are better drained and more completely weathered than the Conasauga, and are more productive soils.

The Shackelton series has practically the same origin as the Armuchee, but differs from that series in the yellow color of its subsoils and lower productiveness. The parent rocks belong entirely

[1] The names of the geological formations used in this report are those used in the Rome and Ringold folios, U. S. Geological Survey.

to the Floyd formation. The Shackelton soils are physically somewhat like the Conasauga, the chief differences being in the lighter color of the Shackelton surface soils, the lower content of clay in the subsoils, the usual presence of fragments of shaly sandstone, flintlike cherty shale, and chert, over the surface and throughout the soil mass. These soils seem to be a little stronger than the Conasauga. The Shackelton series includes a gravelly loam and a silt loam, occupying flat valley lands and low, rolling ridges. In appearance, the gravelly loam is very similar to the Clarksville gravelly loam.

Two other important series, the Dekalb and Hanceville, are derived from sandstone and shales. These soils occupy steep mountain slopes and high plateau areas. The members of the former series, a fine sandy loam and stony loam, are characterized by the grayish color of the surface soils and the yellow color of the subsoils. The Dekalb fine sandy loam occupies the smoother tops of Lookout and Little Sand Mountains, and is adapted to vegetables and fruit. The cool climate at this high altitude militates somewhat against the production of cotton, but corn and cowpeas do well when heavily fertilized. The type is inherently of low productiveness. The Dekalb stony loam is mainly too stony and sloping for agricultural use. The Dekalb soils are derived from sandstones and shales belonging to the Walden, Lookout, and Rockwood formations.

The Hanceville soils are gray to reddish in the surface portion, while the subsoils consist of red, stiff clay. The series comprises four types—the stony loam, fine sandy loam, clay loam, and silt loam. The fine sandy loam occupies flat to gently rolling areas on the summit and higher slopes of Little Sand, Dirtseller, and Kincaid Mountains, and is adapted to about the same crops as the Dekalb fine sandy loam, but is a little more productive. The silt loam and clay loam are situated along lower mountain slopes, having less pronounced gradient than the main mountain sides. They are very well suited to general farming and orcharding. The Hanceville stony loam occurs on the steep western slopes of the higher mountains and ridges and on the escarpment of Lookout Mountain. Owing to its rough topography, this type is largely unsuited for cultivation. The soils of the Hanceville series are derived from the sandstones and shales belonging mainly to the Rockwood formation.

The Montevallo shale loam is a rather variable soil of a grayish-brown color in the surface portion and yellow, red, or mottled yellow, gray, red, and purple color in the subsoil. Fragments of sandstone and variously colored shales are scattered over the surface and mingled with the soil material. The type is derived from the Rockwood formation.

Four series of soils are derived from limestone. These are the Clarksville, Hagerstown, Decatur, and Colbert.

The Clarksville series includes only one type in this area, the Clarksville gravelly loam. This is the most extensive soil in the county, and occurs in a succession of parallel, narrow, and wide ranges or series of hills, crossing the county in a northeast and southwest direction. It consists of a gray, loose silt loam, underlain by a pale-yellow to red silty clay loam, and carrying large amounts of chert fragments on the surface and throughout the soil mass. The type has an especial adaptation to peaches, Irish potatoes, strawberries, and cantaloupes, and gives fair returns with cotton, corn, and cowpeas. The material is derived from cherty limestone of the Knox dolomite, Fort Payne, and Armuchee formations.

The Hagerstown soils are derived from practically chert-free limestones of the Chickamauga, Floyd, and Bangor formations. Characteristically, the surface material has a brown color and mellow structure, while the subsoil consists of a reddish-brown friable clay. The series is represented by a single type, the silt loam, which occupies flat to undulating valley lands. This is a strong, durable soil, admirably suited to general farming.

The Decatur series is also represented by only one type—the Decatur clay loam. This is a reddish-brown to red clay loam, underlain by a moderately friable heavy clay. It occupies gently rolling and moderately sloping areas. The material is derived mainly from chert-free limestone of the Chickamauga and Bangor formations, and also from a relatively chert-free phase of the Knox dolomite and Fort Payne formations, and to a limited extent from limestone of the Floyd formation.

The Colbert series includes three types—the silt loam, silty clay loam, and stony clay. In their typical development these are compact, grayish soils underlain by impervious, sticky, plastic, heavy, yellow clay. They occur as flat valley lands having poor drainage. In their natural condition these soils are not productive, but when artificially drained and carefully managed they are valuable for general farming purposes. The material is derived mainly from chert-free limestone of the Chickamauga formation. Owing to its poor drainage, weathering has not been anywhere nearly so complete as in the case of the Decatur and Hagerstown soils.

The alluvial soils are represented by a single type—the Huntington silt loam. This is a brown, productive soil, occupying stream flood plains. The type is added to by sediments deposited by the frequent overflows.

The following table shows the origin, main characteristics, and relationships of the several soil types:

	Kind of rock.	Formation.	Description of type	Name of soil.
Residual soils.	Sandstone and shale.	Walden, Rockwood, and Lookout.	Gray soil, yellow subsoil; drainage well established; mountain plateaus and slopes.	Dekalb stony loam. Dekalb fine sandy loam.
		Rockwood	Gray to red soils, red subsoils, drainage well established; mountain plateaus and slopes.	Hanceville stony loam. Hanceville fine sandy loam. Hanceville silt loam. Hanceville clay loam.
		Conasauga	Grayish brown soil, yellow subsoil; drainage moderately good; flat valley areas.	Conasauga silt loam.
		Rockwood	Grayish brown soil, yellow, red, or mottled red, yellow, gray, and purple subsoil; drainage well established; low, rolling ridges.	Montevallo shale loam.
	Sandstone and shale with some limestone.	Floyd and Conasauga.	Gray to red soils, red subsoils; drainage well established; flat valley areas and low rolling ridges.	Armuchee loam. Armuchee silt loam. Armuchee clay loam.
		Floyd	Light gray to white soils, yellow subsoils; drainage well established; flat valley areas and low rolling ridges.	Shackelton gravelly loam. Shackelton silt loam.
	Sandstone and shale.	Walden, Rockwood, and Lookout.	Gray and yellow unclassified soil; excessively stony; extremely rough, mountainous topography.	Rough stony land.
	Mainly chert-free limestone.	Knox dolomite, Fort Payne, and Floyd.	Gray to red soil, red subsoil; drainage well established; moderately steep slopes and gently rolling areas	Decatur clay loam.
		Chickamauga, Bangor and Floyd.	Brown soil, reddish-brown, or yellowish-red subsoil; drainage well established; flat to undulating valley areas.	Hagerstown silt loam.
	Cherty limestone.	Chickamauga and Bangor	Gray soils, yellow, plastic subsoils; drainage poorly established; flat valley lands.	Colbert silt loam. Colbert silty clay loam. Colbert stony clay.
		Knox dolomite, Fort Payne, and Armuchee.	Gray soil, yellow to red subsoil; abundant chert; drainage well established; slopes, ridges, and hills.	Clarksville gravelly loam.
Alluvial soils.	Alluvium derived largely from Dekalb, Hanceville, Clarksville, Decatur, Hagerstown, Colbert, Conasauga, Armuchee, and Shackelton soils.	.....	Brown soil, brown subsoil, subject to overflow, but moderately well drained between inundations; flat flood plains.	Huntington silt loam.

Including Rough stony land, 21 soil types were recognized and mapped. The area of each type is given in the following table:

Areas of different soils.

Soil.	Acres.	Per cent.	Soil.	Acres.	Per cent.
Clarksville gravelly loam	71,040	35.6	Hanceville fine sandy loam	3,840	1.9
Dekalb fine sandy loam	16,000	8.0	Armuchee loam	3,520	1.8
Conasauga silt loam	14,720	7.4	Colbert silt loam	2,560	1.3
Huntington silt loam	12,160	6.1	Colbert silty clay loam	2,240	1.1
Dekalb stony loam	10,560	5.3	Hanceville silt loam	1,920	1.0
Hagerstown silt loam	10,560	5.3	Montevallo shale loam	1,280	.6
Decatur clay loam	10,240	5.1	Armuchee silt loam	960	.5
Hanceville stony loam	10,240	5.1	Armuchee clay loam	640	.3
Rough stony land	7,680	3.9	Colbert stony clay	640	.3
Shackelton gravelly loam	7,040	3.5			
Hanceville clay loam	6,080	3.0	Total	199,680	.....
Shackelton silt loam	5,760	2.9			

The various soil types are described in greater detail, and their crop values, crop adaptations, and requisite methods of treatment are set forth in the following type descriptions.

DEKALB FINE SANDY LOAM.

The Dekalb fine sandy loam consists of a gray to grayish-brown or pale-yellow friable fine sandy loam underlain at about 6 to 15 inches by a yellow or pale-yellow, friable, moderately compact, heavy fine sandy loam or sandy clay loam extending to a depth of 3 feet or more. Sandstone fragments are scattered over the surface of most of the type, the quantity being greatest in the more rolling areas, where the character of the soil approaches that of a stony, sandy loam in the rougher situations near stream courses.

The type is confined largely to the smooth plateaus of Lookout Mountain in the northwestern part of the county and Little Sand Mountain in the eastern part of the county. Smaller areas were found on Kincaid and Dirtseller Mountains.

The surface is flat to gently rolling. In some places streams have cut gorgelike valleys, the walls of which are decidedly stony. The type has good to excessive drainage, yet with proper management it can be made to conserve moisture in amounts sufficient for the needs of crops under normal conditions of rainfall.

Areas of this type are locally known as "gray lands" as distinguished from the soils of the Hanceville series, which are locally referred to as "red lands." The material is derived from underlying fine-grained, light-colored sandstone of the Walden and Lookout formations.

On Lookout Mountain the greater part of the type is forested with oak, hickory, chestnut, dogwood, and a scrubby growth of pine. Here the type is sparsely settled, the occasional farms comprising small areas of cultivated lands, maintained usually in a rather low state of efficiency. The principal products are corn, cowpeas, Irish and sweet potatoes, and apples and peaches from small orchards. The Lookout Mountain variety of Irish potatoes, which have a reputation for their good keeping qualities, are grown quite successfully. The yields of corn are low, ranging from about 10 to 20 bushels per acre. Watermelons, sweet potatoes, sorghum, oats, and cabbage are grown in a limited way. The agricultural development of this section is retarded by the inaccessibility of the land, the roads leading from the mountain being rough and steep. The chief interest of the inhabitants is in lumbering. Owing to the ease with which the soil is cultivated and good results had with a variety of crops, especially fruit, potatoes, and vegetables, it is likely that agriculture will sometime assume a more important place.

On Little Sand Mountain the Dekalb fine sandy loam is more extensively farmed. The better methods practiced in this section have brought about a greater degree of prosperity. The principal crops grown on this development of the type are cotton, corn, cowpeas, sorghum, Irish and sweet potatoes, watermelons, and a number of vegetables for home use. Peaches do very well, but at present are not extensively grown.

The most important needs of the Dekalb fine sandy loam, in the way of improvement, are deeper plowing, the incorporation of large amounts of vegetable matter, such as cowpeas plowed under green, and heavy applications of complete fertilizer mixtures. The tendency of the high altitude to retard crop development is compensated in some degree by the warm nature of the open, well-drained soil, which tends to force the crops to early maturity. Phosphate fertilizers can very likely be used advantageously in hastening maturity, particularly in the case of cotton.

The present value of the Dekalb fine sandy loam, where not affected by the forest growth, varies from $1 to $10 an acre.

DEKALB STONY LOAM.

The Dekalb stony loam varies considerably in character and content of rock fragments as well as in the color and depth of the soil and proximity to the surface of the underlying rock formations. The greater part of the type consists of a gray or grayish-brown silt loam underlain at about 6 to 14 inches by a yellowish silty clay loam which extends to depths varying from about 24 inches to a little over 3 feet. The subsoil in places is mottled somewhat with shades of yellow and red, and frequently represents partially decomposed fragments of

shale. Some areas, too small in extent or too intricately associated with the typical soil to admit of accurate mapping, have a reddish subsoil approaching the characteristics of the Hanceville. Throughout most of the type a sufficient quantity of sandstone fragments and blocks or flaggy pieces of thick and thin sandy shale is scattered over the surface and disseminated through the soil section to give the soil a characteristic stony nature. Nearly everywhere fragments of partially weathered shale in large quantities occur throughout the soil section. Along the lower slopes the depth to bedrock is usually greater than on the upper slopes, where ledges of shale and sandstone frequently outcrop.

The soil material is derived principally from shales. Sandstone is represented largely by fragments occurring on the surface and throughout the soil mass. The parent rocks belong largely to the Lookout, Walden, and Rockwood formations.

This type comprises a large area. Approximately the eastern half of Taylor Ridge is occupied by the Dekalb stony loam. A long, narrow strip borders Little Sand Mountain on its eastern slope. There is also a considerable body east of Hammonds Gap in the northeastern portion of the county. Other areas occur on Simms and Dirtseller Mountains.

The Dekalb stony loam occupies steep mountain slopes, rising to an elevation of about 500 to 800 feet above the level of the adjacent valleys. Streams have cut deep, gorgelike valleys flanked with very steep slopes. Only a very small part of the type, represented by some of the lower slopes, occasional benchlike areas, and the smoother areas near the crests can be utilized for agricultural purposes, and these would be best suited for orchards. Only the very smoothest portions of the type could be plowed, and even here the abundance of rocks would afford a considerable hinderance to tillage. A large total area is too steep to admit of any kind of cultivation. Under present conditions of development in this region the Dekalb stony loam in general is unsuited for agricultural purposes. Its best use is for grazing and forestry, as almost all of it is covered with oak, chestnut, hickory, and pine.

HANCEVILLE FINE SANDY LOAM.

The soil of the Hanceville fine sandy loam consists of a light-brown to grayish-brown fine sandy loam extending to an average depth of 6 to 8 inches. As the subsoil of the type is approached the soil becomes slightly heavier in texture and grades into a reddish-brown color. The soil is comparatively loose on the immediate surface, but becomes more coherent as the depth increases. It is friable and with cultivation works into a good tilth. The subsoil is a deep red clay, which is somewhat stiff but generally friable in structure.

Owing to the influence of the topography the soil varies in depth, color, and textural features. On the more rolling areas most of the fine sandy material has been removed by erosion, thereby yielding a heavier textured and more brownish soil than on the more level areas where erosion has not been so active.

The area of this type as mapped on Kincaid Mountain varies from the average in that the soil is gray to yellowish gray in color and the subsoil, instead of having a deep-red color from the soil down to the 3-foot limit of the profile, consists of a yellowish-red fine sandy clay to a depth of 18 to 24 inches, when it changes to a deep-red friable clay. However, within this general area there are local areas or spots in which the red subsoil occurs from the surface downward.

The Hanceville fine sandy loam is not extensively developed in the county, the chief and largest area mapped being found in the northeastern part of the survey, which practically occupies the top of Little Sand Mountain. The second area of importance is in the northern end of Dirtseller Mountain, located in the southeastern part of the county. A third area is found on the northern extremity of Kincaid Mountain.

The type owes its origin to the weathering of the sandy shales and beds of sandstone of the Rockwood formation on Dirtseller and Kincaid Mountains and to the decomposition of the Lookout sandstone of Little Sand Mountain. Rocks and fragments of these formations occur on the surface and within the subsoil. The rocks are entirely sandstone of either red or yellow color. The shales of the formation have been weathered to a much greater depth than the sandstones, and are exposed in excavations at depths of 10 to 12 feet. Unweathered sandstone is encountered generally at depths of 2 to 3 feet.

The topographic features of the Hanceville fine sandy loam consist of long, gentle slopes forming the sides of the synclinal troughs in the interior of Dirtseller and Kincaid Mountains. The type is well drained, but owing to the steepness of the slopes in places the soil is subject to damage by erosion unless protected by terraces and growing crops. The topography of the type on Little Sand Mountain varies from level to gently rolling, and the drainage is good.

The type is chiefly utilized for the production of peaches on Dirtseller and Kincaid Mountains and for general farm crops on Little Sand Mountain. This soil has been recognized as one of the best in the State for the production of peaches, on account of the good shipping qualities and the highly developed color of the fruit obtained. The topographic features are especially suited for the production of this fruit, owing to the protection afforded the buds in early spring. Apple orchards have also been set out on this type, and although the trees have not produced as yet, they show great thrift and healthful-

ness. Because of the altitude a very small acreage of cotton is found on the type. Corn produces from 12 to 30 bushels per acre, depending upon the cultural and manurial treatment used. The type is well suited to the production of watermelons, cantaloupes, and sweet and Irish potatoes. The soil is also recommended for the production of alfalfa.

HANCEVILLE STONY LOAM.

The soil of the Hanceville stony loam consists of a reddish-brown clay loam or heavy loam which has an average depth of 8 to 10 inches. This grades into a heavy, reddish-brown or red clay loam subsoil which often changes to a clay in the deeper subsoil in areas where the underlying rock is not encountered within 3 feet of the surface. A large quantity of rock fragments is scattered on the surface and mixed with both the soil and subsoil. The rock fragments are almost wholly sandstone, and vary in size from small, angular gravel to bowlders several feet in diameter. Over the greater part of the type these sandstone fragments are present in such large quantities as to make the soil unsuitable for the growing of any crops which would require the thorough cultivation of the land. The soil as a whole is very shallow, the underlying sandstone usually occurring at a depth of 2 to 3 feet below the surface. Areas of rock outcrop occur at frequent intervals along the steeper slopes.

The type occurs as narrow strips along the steeper slopes of all of the higher ridges and mountains in the county. The largest area occurs along the western slope of Taylor Ridge, but narrow areas are also found along the steep slopes of John, Kincaid, and Dirtseller Mountains, and along the steep eastern slope of Lookout Mountain. The slopes occupied by this type are usually very steep and are cut by frequent deep and rocky gorges. Areas where the topography is level enough to permit the land to be utilized for agricultural purposes are of infrequent occurrence and of very limited extent.

The Hanceville stony loam is derived from the weathering of beds of hard brown to reddish-brown sandstone and sandy shales. The shale weathers more rapidly than the sandstone and forms the greater part of the soil mass, while the sandstone is more resistant to weathering and, consequently, forms most of the coarse material. On account of the rough, stony character and inaccessibility of a large section of the area occupied by this type, it was not practicable to map it in as much detail as was employed in the separation of the types suitable for agriculture, and the areas of Hanceville stony loam indicated on the map, therefore, include many more or less extensive areas which could be classed as Rough stony land.

At present none of the Hanceville stony loam is under cultivation. It is utilized to a small extent as pasture land for cattle, sheep, and

goats, but it is valued principally for the forest it supports. The soil, as it occurs in this area, is better suited for forestry than for agriculture.

HANCEVILLE SILT LOAM.

The Hanceville silt loam consists of a gray to slightly reddish silt loam underlain at about 8 to 10 inches by a stiff red clay, which in places is slightly mottled with yellow.

The type, as developed in the vicinity of Anderson Store, occupies the lower slopes of mountains adjacent to high-lying areas of the Hanceville stony loam. The largest area of the type, the strip extending from west of Johnson School, through New and Subligna, to the northern county line, occupies a slight ridge which seems to represent the southern extension of Dick Ridge.

In general the gradient is not so steep as that of the Hanceville clay loam, which probably accounts for the presence of a larger amount of silt in the surface portion of the type. The surface, however, is sufficiently steep in most places to render the land susceptible to erosion and the type includes occasional gall spots or patches in which the silty surface soil has been worked away so as to expose the underlying clay. Sandstone and shale fragments are scattered over the surface and intermingled with the soil material in varying quantities, generally in amounts not sufficient to interfere with cultivation.

The soil material of this type consists largely of silt and clay derived from shale and fine-grained sandstones. Like the Hanceville clay loam, this soil represents material accumulated in part by creep or colluvial wash from above and partly by the decomposition of the underlying shale and sandstone.

This type is used in the production of corn and cotton, the yields being very nearly the same as those secured from the Hanceville clay loam. The soil is somewhat more easily kept in a good condition of tilth than the Hanceville clay loam, and on that account it conserves moisture better, with the result that the crops grown are more able to withstand droughts.

HANCEVILLE CLAY LOAM.

The Hanceville clay loam, in its typical development, consists of a reddish-brown loam to clay loam underlain at about 5 to 7 inches by a stiff red clay. Fragments of sandstone are scattered over the surface and disseminated throughout the soil mass. The sandstone fragments in the soil are so irregularly distributed as to indicate that they have fallen from above. In some places these rocks are present in sufficient quantities to give the soil a decided stony character, but such areas are not large enough to map. The type also includes patches in which the surface soil consists of a grayish-brown loam. These areas, too, were not large enough to be shown on the map.

This type has a moderately extensive total area and occupies lower slopes, adjoining the much steeper Hanceville stony loam of the mountain sides. The most important bodies are the narrow strips following the eastern slope of Taylor Ridge from near the northern county line to the vicinity of Anderson Store, the strip extending along the southeastern slope of Taylor Ridge from near Anderson Store in an easterly direction to near the county line, and then southeasterly along the foot of Simms Mountain, the strip representing the lower eastern slope of Lookout Mountain. Small areas also occur on the west side of John Mountain, on the east and west slopes of Kincaid Mountain, and along the lower slopes of Dirtseller and Little Sand Mountains.

While a part of the material is probably residual from sandstone and shale in places, the greater part has probably accumulated by slumping or creep from the contiguous higher slopes occupied by the Hanceville stony loam. Occasionally chert fragments are seen. These very likely have come from thin beds of limestone associated with the parent sandstone and shale.

On account of the sloping topography, erosion has injured some areas by gullying and by washing off the surface soil to expose the unproductive, fresh subsoil clay. The drainage of the entire type, however, is well established.

Although this soil very closely resembles the Decatur clay loam, it is not so productive, and, topographically, is not as well suited to cultivation. While much of the type is forested with hardwood and pine, a large part of it is cultivated to corn and cotton. Where the slope is not too steep to allow proper cultivation, from one-fourth to 1 bale of cotton and 10 to 20 bushels of corn per acre are produced. Better yields can be secured by deep plowing, liming, the incorporation of vegetable matter, such as the turning under of cowpeas, and by the addition of rather liberal amounts of complete fertilizer mixtures. Some areas are too steep for safe cultivation unless terraced. The steeper slopes should be used in the production of peaches and grass crops.

MONTEVALLO SHALE LOAM.

The Montevallo shale loam is a variable type of low agricultural value. The greater part of this soil is a grayish to light-brown, shallow silt loam or silty clay loam, which quickly grades into yellowish to reddish silty clay loam or silty clay, variously mottled with red and purple. In many places a mass of partially decomposed shale fragments, varying in color from yellow to mottled yellow, gray, red, and purple, is encountered in the 3-foot section. Portions of the type represent typical developments of the Dekalb and Hanceville silt loams, but these were too intricately associated

with the dominant soil to permit satisfactory mapping on the scale used.

Fragments of slabby sandstone occur on the surface. Variously colored shale fragments are nearly everywhere encountered on the surface and throughout the soil mass.

The Montevallo shale loam occurs in a long narrow strip extending from the northern county boundary in a southeasterly direction by Teloga, Chelsea, and Menlo to the Alabama line. Its surface varies from moderately to steeply sloping. Its main development is along the eastern slope of Shinbone Ridge.

The material is derived largely from shale, the associated sandstone having little influence on the character of the soil as a whole. The parent rock belongs to the Rockwood formation.

A small part of the type is farmed, principally to cotton, corn, and cowpeas, and the yields secured are generally low. With deeper plowing, applications of lime, the addition of complete commercial fertilizers in liberal amounts, and the incorporation of large quantities of vegetable matter, some of the smoother areas in which the depth to the underlying shale is not less than 2 feet could be successfully used for cotton, corn, cowpeas, sorghum, and possibly small grain.

CONASAUGA SILT LOAM.

The soil of the Conasauga silt loam to a depth of about 6 to 8 inches consists of a grayish-brown to light-brown silt loam of low organic-matter content. The subsoil is a pale-yellow or yellow, compact, brittle to friable silty clay loam, which grades below into a yellow silty clay of a brittle to slightly plastic structure. The lower portion of the subsoil is generally mottled faintly with gray, or gray and yellowish red or red. In places black ferruginous material, often in the form of roundish concretions, is encountered in the subsoil. The bright red material of the lower subsoil also represents iron concretions.

The silty texture of the soil and its low content of organic matter are favorable to a rapid loss of moisture through surface evaporation, causing the soil to assume a compact structure when dry. In some areas hard usage of the soil without restoration of the organic matter has brought about a very unfavorable compact structure. Such spots are indicated by their light-gray color. These are also included in the patches, especially on the gentle slopes, in which the silt loam surface material has been washed off so as to expose the yellow silty clay loam subsoil. In other places the partially decomposed parent shale is encountered within the 3-foot section, fragments of such material sometimes being moderately abundant on the surface and throughout the soil section. These phases are less retentive of moisture than

the typical brownish silt loam soil and on them crops are more frequently injured in dry seasons.

The type has its most extensive development in the long strips extending in a northeast to southwest direction across or nearly across the county, in Chattooga and Broomtown Valleys.

Characteristically, the topography is flat, the type being developed as nearly level valley lands. There are, however, many slight ridges and knolls and gently sloping areas. In these areas of less even surface configuration where the slope is sharpest, erosion has been active, and a few shallow gullies have been formed. The surface drainage is good, with the exception of some of the more nearly level areas and slight depressions. It is in situations of this kind that the gray mottling of the subsoil is most conspicuous. Ditching or tiling would improve the condition of these poorly drained areas.

The Conasauga silt loam is derived from argillaceous, thin-bedded shales, which, as seen in exposures of the partially weathered rock, are dominantly of an olive, yellowish, and reddish color. In those situations where the drainage is best established, as on slopes and slight elevations, the superior aeration and oxidation have brought about a reddish color in the subsoil, approaching the color of the Armuchee silt loam subsoil. The shale is usually tilted at various angles, sometimes standing perpendicular.

The Conasauga silt loam is utilized, practically throughout its entire extent, in the production of general farm crops, including cotton, corn, and cowpeas. Inextensive areas here and there are used for small grain, sorghum, grass, and clover. Cotton ordinarily yields about one-fourth to one-half bale and corn from 15 to 30 bushels per acre. These crops are generally fertilized with the ordinary grades of commercial fertilizers, analyzing approximately 10 per cent phosphoric acid, 2 per cent nitrogen, and 2 per cent potash. The applications generally range from about 200 to 300 pounds per acre for both cotton and corn. Those farmers who employ better methods of soil preparation and cultivation, practice crop rotations which include the legumes, usually cowpeas, and make heavier applications of the better grades of commercial fertilizers, secure better yields of all crops. With the better methods of management from three-fourths to 1 bale of cotton per acre and 30, 40, or 50 bushels of corn are secured. Cowpeas produce about 1 ton of hay per acre in the better managed fields. The crop also fruits well and can be grown to advantage on this soil either for the hay or seed.

Formerly where the soil was in a fresher condition—that is, before the vegetable matter had been reduced to the present low average content—wheat was extensively grown with fairly good results. At

present, however, this crop is rarely grown, farmers claiming that the yields are too low for profitable returns. Sorghum, which is grown in patches by a good many farmers, produces good yields of sirup. This crop is also sown broadcast for hay. If sown with cowpeas, it makes very good yields of nutritious hay.

Irish potatoes are grown for home use and sometimes for shipment. Fair yields are made, and it is believed that the production of this crop could be extended profitably.

Lespedeza flourishes in untended fields and affords good grazing. It is occasionally cut for hay, but better yields could be secured by seeding on well-prepared land.

In view of the fact that the soil is of an acid nature, applications of burnt lime or ground limestone could be made with good results. Acreage applications of something like 1 ton of burnt lime or twice this amount of finely ground limestone are recommended. Better results may be had in the use of lime, as well as in the use of commercial fertilizer, where the soil is properly supplied with vegetable matter. The most important needs of the Conasauga silt loam are deeper plowing and the incorporation of vegetable matter, such as cowpeas, vetch, and rye, plowed under in the green or partially matured stage. The land should be broken in the fall, the depth being increased gradually about 1 or 2 inches a year until a furrow slice of 6 to 8 or 10 inches is worked up.

Very beneficial results could be had by following fall breaking with a winter cover crop, such as vetch or rye, or a mixture of these, the crop to be plowed under the following spring preceding cultivation to cotton, corn, or other crops.

In the use of commercial fertilizers it is recommended that heavier applications of better grades be made. Mixtures should be used which contain a relatively low percentage of phosphoric acid. It is believed that an average application of approximately 500 pounds of a commercial or home mixture analyzing approximately 10 per cent phosphoric acid, 3 or 4 per cent nitrogen, and 4 per cent potash would profitably increase yields of cotton, corn, sorghum, and grain crops, as well as Irish potatoes. The percentage of nitrogen required can be materially reduced by practicing rotations including the legumes, a crop of which should be grown at least once every two years.

ARMUCHEE LOAM.

In its typical development the Armuchee loam consists of a light-brown to slightly reddish brown light loam, containing an appreciable amount of fine sand. The subsoil beginning at about 8 to 10 inches is a red friable fine sandy clay loam, grading below into heavier material or a fine sandy clay having a moderately friable structure. In exposures the subsoil cracks into small aggregates upon drying out.

The type includes some noticeably sandy areas having essentially the texture of a fine sandy loam, but such areas were too small in size to warrant their recognition as a separate type. There are small areas in which considerable quantities of sandstone and shale and some chert fragments occur on the surface and throughout the soil mass.

In color and structural characteristics the soil resembles the Hanceville, but it is more productive than the similar-textured soil of that series.

The type occupies relatively low ridges, gentle slopes, and moderately rolling areas. Its topography favors good surface drainage, the run-off being so rapid in some places as to cause washing and gullying of the land. The surface soil has been washed from some small patches, exposing the subsoil. In places along the gentler lower slopes material washed from above has accumulated to a considerable depth, giving the type in such situations a much deeper soil than on the higher slopes. The underdrainage is well established.

The Armuchee loam has its most extensive development to the south of New in the vicinity of Farmersville School and Pleasant Grove Church. Another important area is a long, narrow strip following the western side of East Armuchee Creek for a distance of 7½ miles in the northeastern section of the county.

The material of this type is derived from thin and thick bedded shales of olive, yellow, gray, reddish, black, and brownish colors interbedded with reddish and grayish fine-grained sandstone strata ranging from one-half inch to about 6 inches in thickness and with some dark-colored to black strata of a flintlike cherty shale having a thickness of about one-half inch to 3 inches. In view of the fact that fragments of chert and cherty shale are present here and there throughout the soil, it appears that some limestone material enters into the composition of the type. The type is closely related in origin to the Shackelton gravelly loam, with which it is also closely associated in occurrence. Occasionally the subsoil varies in color from yellowish to mottled yellow and red, such areas representing an approach toward the characteristics of the subsoil of the Shackelton series—a condition in which oxidation has not been so complete as in the typical Armuchee loam.

This type, which is locally known as "red land," is held in good esteem for the production of general farm crops. It is suited to the production of cotton, corn, wheat, and cowpeas, and a considerable proportion of the type is under cultivation to these crops. With good management cotton should give a yield of one-half to three-fourths bale per acre and corn from 25 to 50 bushels. Cowpeas produce a heavy growth of vine and seed. The average yields of cotton and corn are somewhat lower than the figures given above

on account of inefficient management, although on the other hand these figures have been exceeded in carefully handled fields. For the best results the land should be plowed in the fall and seeded to some winter cover crop, as vetch or rye, and an occasional crop to be plowed under green to supply needed organic matter. Those rotations should be practiced which include a legume once in every two years. Cowpeas have a very ameliorative effect on the soil, supplying vegetable matter even where cut for hay and storing in the soils some nitrogen gathered from the air, while the roots open up the subsurface and subsoil to a better circulation of moisture and air. Acreage applications of 1,500 to 2,000 pounds of burnt lime or 1½ to 2 tons of ground limestone would materially benefit the land. Such an application would probably be sufficient for a period of 8 to 10 years. Moderate fertilization with complete mixtures may be expected to give profitable increases in the yields of the crops generally grown.

Peaches, Irish and sweet potatoes, melons, vetch, rye, oats, and cabbage will succeed on this type of soil.

The steeper slopes should be terraced in order to prevent erosion. Deep plowing, the addition of vegetable matter, and the growing of winter cover crops are also effective in checking erosion.

The following table gives the results of mechanical analyses of samples of soil and subsoil of this type:

Mechanical analyses of Armuchee loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
252417	Soil	0.3	1.0	1.0	23.8	13.6	48.8	11.3
252418	Subsoil	.0	.4	.3	21.5	10.1	42.6	24.7

ARMUCHEE SILT LOAM.

The Armuchee silt loam consists of a light-brown to slightly reddish-brown silt loam, underlain at about 5 to 8 inches by a red clay loam which grades downward into a rather stiff compact red clay. The type includes many eroded spots where the red clay loam is exposed at the surface. Some areas of Conasauga silt loam, too small to map separately, have been included within the type. On the other hand, a number of patches of the Armuchee silt loam have been mapped with the Conasauga silt loam.

The type occupies gentle slopes and slight elevations in the valleys. It has excellent surface drainage and good underdrainage. The growth of crops is often seriously checked by dry periods, especially where the clay is exposed or comes nearly to the surface.

The most important areas are represented by the strip along the east side of Teloga Creek and the small bodies to the east of Subligna and near Kartah.

This soil has a common origin with the Conasauga silt loam, being derived almost wholly from thin-bedded shales. The red color is accounted for by the better drainage and consequently more complete oxidation of the material. The partially weathered soft variegated shale is encountered within the 3-foot section of some areas.

This type is more productive than the Conasauga silt loam, giving with the same treatment 10 to 15 per cent better yields than those secured from the Conasauga, particularly in the case of cotton. Cowpeas give heavy yields of seed. Deeper plowing, applications of lime, the incorporation of vegetable matter, and fertilization with complete mixtures are the best methods for increasing the productiveness of the soil.

ARMUCHEE CLAY LOAM.

In its typical development the Armuchee clay loam consists of a moderately friable red clay loam underlain at a depth of about 5 to 8 inches by a rather stiff red clay. Locally the subsoil is slightly mottled with yellow. On the steeper slopes small areas have been washed so badly that the subsoil is exposed at the surface, and in some instances deep gullies have been formed. A number of patches in which the texture of the surface soil is that of a loam were included with the type because of their small size.

The type comprises only a small total area. It is, however, a good strong soil of considerable local importance. The most important areas occur in the vicinity of Johnson School, Pleasant Grove Church, Kartah, and Storys. The type is largely confined to gentle slopes.

The soil material of this type and of the Armuchee loam is derived from the same kind of rocks, thin shales interbedded with thick, hard, compact shales, fine-grained sandstones, and a dark-colored flintlike cherty shale. A few fragments of sandstone and blocks of thick-bedded shale and the peculiar flintlike cherty shale are scattered over the surface and disseminated through the soil mass.

Practically the entire area is cultivated to cotton, corn, and in a smaller way to cowpeas and sorghum. With good soil management cotton yields one-half to three-fourths bale and corn from 25 to 60 bushels per acre. Cowpeas make a heavy growth of vine and seed on this soil.

For best results this land should be broken in the fall to a depth of at least 8 inches and seeded to some such winter cover crop, as rye or vetch, to prevent erosion. In increasing the depth of plowing, not more than 1 to 2 inches of the raw clay should be turned to the surface in a single season. The leguminous crops, particularly cowpeas and

clover, should be included in rotations, and occasionally one of these, or rye or vetch, should be plowed under to supply needed vegetable matter. Cowpeas have a very beneficial effect upon the soil, whether cut for hay or plowed under. An acreage application of one or two tons of burnt lime unquestionably would benefit the land, particularly in bringing about a friable structure favorable to the maintenance of a good supply of moisture. Lime is especially beneficial in improving the productiveness of freshly eroded areas where the clay is exposed and in bringing about a favorable condition where raw clay is turned to the surface. The steeper slopes should be terraced in order to prevent erosion, and the steepest slopes should be seeded to grasses, such as orchard grass, tall meadow oat grass, Bermuda grass or lespedeza.

Peaches thrive on this type of soil, but its area is not sufficiently extensive to permit the planting of large orchards.

The following table gives the results of mechanical analyses of samples of the soil and subsoil of this type:

Mechanical analyses of Armuchee clay loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
252426	Soil	0.4	1.1	1.0	27.6	14.2	31.2	24.2
252427	Subsoil	.8	1.1	.9	15.0	7.4	31.7	42.9

SHACKELTON GRAVELLY LOAM.

The Shackelton gravelly loam closely resembles the Clarksville gravelly loam in color of soil and subsoil, but it differs in the character of gravel present. In some respects the type shows a relationship to the Conasauga silt loam. The most important difference in this case, aside from the more uneven surface configuration and the presence of a larger amount of variable gravel, is in the lighter colored surface soil of the Shackelton gravelly loam and the somewhat paler yellow color of the subsoil, and its lower content of clay together with the varied color of the parent rocks.

Typically the soil consists of a light-gray to nearly white, loose, floury silt loam, grading below into pale-yellow or yellowish-gray, friable silt loam. Ordinarily the gray soil extends to a depth of about 3 to 5 inches and the pale-yellow subsoil to about 10 inches. The line of separation between subsurface soil and subsoil is very indistinct, the one blending with the other in such a way that any line of division must necessarily be more or less arbitrary. The subsoil proper consists of a pale-yellow, light silty clay loam, which gradually becomes heavier in texture and deeper yellow in color

with increase in depth, until at about 24 to 30 inches it consists of a yellow, crumbly silty clay loam. The lower portion of the subsoil and the substratum are generally mottled faintly with gray and shades of yellow and red.

Fragments of thin, soft shale, blocks of thick-bedded, compact, tough shale having a dark-grayish to brownish color, blocks of extremely hard, bluish-gray to almost black cherty shale varying in structure from laminated to flintlike, and fragments of flaggy sandstone are scattered over the surface and disseminated throughout the soil mass in quantities sufficient to give the type a pronounced gravelly character. Fragments and blocks of grayish, porous, and flinty chert in varying amounts are also present in the soil. These vary in size from very small fragments to blocks having a thickness of several inches. The effect of such rocky material upon the soil is to impart a more porous nature, favoring much better aeration and underdrainage than would otherwise obtain, since the fine silty material is inclined to become compact upon drying out. These fragments also are effective in preventing erosion, both by making the soil more absorptive of the ain water and by holding the particles in place against water action.

The Shackelton gravelly loam occupies gently rolling to rolling or hillocky land, rising in places to an altitude of approximately 200 feet above the level of the associated valleys. Practically the entire area can be easily cultivated so far as the topography is concerned. Both surface drainage and underdrainage are good.

The type is confined to the eastern part of the county, where it occurs as a belt extending from the vicinity of New southwesterly to the neighborhood of Storys and thence in a broader development to the vicinity of Silver Hill School.

The material of this type is derived from the weathering of interbedded, thin, yellowish, olive, grayish, and reddish, and carbonaceous, black shales, thick-bedded, bluish-gray, and brownish, tough shales, strata of a very hard, laminated to flinty or glassy structured, dark-bluish to nearly black cherty shale of an inch or more in thickness, and strata of fine-grained sandstone, varying from an inch to about 6 inches or more in thickness. These rocks have been classified by the United States Geological Survey as belonging to the Floyd formation. Although no limestone was seen interstratified with the above rocks in sections, the presence of chert fragments in the soil indicates that the type includes some material derived from limestone. Bluish limestone was seen in several places underlying the rocks described above. In the neighborhood of Shackelton limestone is being quarried from an exposed strata about 10 to 15 feet beneath the surface of this type.

A part of the type is under cultivation to the general farm crops of the region. It is not considered as a naturally strong soil, but with proper management it can be built up to a fairly good state of efficiency. Inherently the type seems to be somewhat more productive than the Conasauga silt loam. This may be due to the better drainage and aeration provided by the more porous structure of soil and subsoil and to the influence of included limestone material. The original productivity of this soil is about the same as that of the Clarksville gravelly loam, and its crop adaptation and requisite cultural methods also conform closely to those of the Clarksville.

Cotton yields about one-fourth to one-half bale and corn 10 to 25 bushels per acre under the ordinary methods of soil treatment. Considering the thorough drainage of the soil, these crops withstand the effects of drought surprisingly well, frequently retaining in properly cultivated fields a good green color over considerable periods of dry weather.

Cowpeas give good yields of seed, but do not produce a very heavy vine growth. It is believed that peaches, Irish potatoes, and strawberries can be grown with success. These adaptations are suggested by the similarity of the material of the Clarksville gravelly loam and not by field results, since such crops are not grown to any great extent upon the type.

Inasmuch as the soil is decidedly deficient in organic matter, this condition should be corrected by plowing under an occasional crop of cowpeas, clover, vetch, or rye. By providing a better supply of humus, with deeper plowing, and with the application of 500 pounds per acre of a fertilizer mixture analyzing about 8 per cent phosphoric acid, 3 per cent nitrogen, and 5 per cent potash, the yields of crops suited to this soil can be profitably increased.

Average results of mechanical analyses of samples of the soil, subsoil, and lower subsoil are given in the following table:

Mechanical analyses of Shackelton gravelly loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
252419, 252423	Soil	2.2	2.7	1.3	3.3	9.1	63.6	17.5
252420, 252424	Subsoil	1.8	2.5	1.2	3.5	10.6	58.2	22.2
252425	Lower subsoil	.2	.6	.3	.9	.9	49.7	47.4

SHACKELTON SILT LOAM.

The Shackelton silt loam consists of a gray, compact silt loam having a floury feel and underlain at about 2 to 4 inches by grayish-yellow or pale-yellow, heavy silt loam extending to a depth of 6 to 8 inches. There is no distinct line of demarcation between soil and

subsoil, the former gradually increasing in clay content downward until the texture of a silty clay loam is attained. The subsoil is a pale-yellow, light silty clay loam, grading below into yellow silty clay loam to silty clay, often faintly mottled below a depth of 24 inches with gray and shades of yellow and red. Usually the subsoil is quite compact, while the soil is strongly inclined to puddle in wet seasons and bake with subsequent dry weather, assuming an unfavorable, compact condition.

The character of the soil material is identical with that of the fine material of the Shackelton gravelly loam. The important difference between these two types is the relative scarcity of rock fragments in the case of the silt loam type, with the consequent greater tendency of this type to assume a compact structure unfavorable to a proper circulation of air and moisture. A few fragments of shale, sandstone, chert, and a very tough, flintlike, dark-colored cherty shale are encountered throughout the soil mass and on the surface.

The type occupies the lower slopes and smoother areas, where it is associated with the Shackelton gravelly loam, and low, flat or nearly flat valley lands. The main portion of the type occurs in Dirttown Valley between New and Shackelton. This development represents the more level areas of the type. A higher, more sloping phase is encountered in a number of detached areas in the low ridge section in the neighborhood of Johnson School, Zula, and between Storys and Silver Hill School.

The material is common in origin with the Shackelton gravelly loam, with the exception that less sandstone is included with the parent rocks. Owing to the denser structure of soil and subsoil, the underdrainage is not so perfect as that of the gravelly loam member of the series. Surface drainage is well established over the main portion of the type.

The Shackelton silt loam is best suited to the production of corn, cotton, cowpeas, wheat, Irish potatoes, and grass. Sorghum does well, and where sown broadcast with cowpeas makes heavy yields of hay. With the same crop treatment, the yields seem to be somewhat better than those secured from the Conasauga silt loam.

The soil can be markedly improved by deep plowing and the incorporation of vegetable matter to effect a mellow structure. Acreage applications of about 1 ton of burnt lime or 2 tons of ground limestone would correct acidity and assist in improving the working qualities of the soil, making it easier to maintain the desired pulverulent condition.

Those varieties of cotton which mature slowly upon this somewhat cold-natured soil would be hastened toward development by applications of phosphatic fertilizers. A moderate treatment with complete

fertilizer mixtures can be profitably practiced in conjunction with deep plowing, liming, and the introduction of vegetable matter.

The following table gives the results of mechanical analyses of samples of the soil and subsoil of this type:

Mechanical analyses of Shackelton silt loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
252415	Soil	0.2	1.2	0.4	6.9	12.6	62.1	16.0
252416	Subsoil	1.3	1.0	.2	4.7	14.6	56.3	21.8

ROUGH STONY LAND.

The classification under the name of Rough stony land includes steep, stony, mountain land, the sloping topography and stony character of which precludes any kind of agricultural utilization. This land, excepting the occasional bare cliffs or rock outcrops, is entirely occupied by forests of hardwood and pine. The rock material consists entirely of sandstone, shale, and sandy shale, while the thin soil varies from Dekalb silt loam and fine sandy loam to Hanceville clay loam, silt loam, and fine sandy loam.

The boundaries between this classification and the main mountain types, the Dekalb and Hanceville stony loams, were drawn rather roughly owing to the inaccessibility of these lands and to the fact that they are of little importance from an agricultural standpoint.

The largest areas of Rough stony land are those on Taylor Ridge, John Mountain, the eastern escarpment of Lookout Mountain, and along the steeper slopes of Dirtseller and Kincaid Mountains.

DECATUR CLAY LOAM.

The soil of the typical Decatur clay loam is a reddish-brown or red, mellow silty clay loam to clay loam, from about 5 to 10 inches deep, while the subsoil is a deep-red, heavy clay of a moderately friable or crumbly structure. The type includes a considerable number of eroded patches, where the clay is either exposed or lies within an inch or so of the surface. There are also many patches, too small to map, in which the surface soil has the texture of a silt loam or loam, but the soil of such areas is generally so shallow that sufficient clay is turned up by ordinary plowing to give cultivated fields the texture of a silty clay loam or clay loam. Chert fragments are not uncommon on the surface and in the soil mass, some small bodies containing enough material of this kind to constitute typical developments of the Decatur chert loam.

The most important areas of the Decatur clay loam in its typical development are those in Chattooga Valley, to the north and south of Summerville, the long narrow strips extending from the northern county line southwesterly through Broomtown Valley to the vicinity of Chelsea and Menlo, and the rather wide development southwest of Chelsea to the western State line, north and south of Alpine. The areas south of Lyerly and to the southwest of Holland are also extensive. Other smaller areas occur here and there throughout the limestone valleys.

An important phase of the type is represented by the long, narrow strip occupying the eastern lower slope of Taylor Ridge from the vicinity of Shakelton to the neighborhood of New. This phase differs from the typical Decatur clay loam in that sandstone fragments are scattered over the surface and mixed with the soil and subsoil, usually in conspicuous amounts. Fragments of chert also are common to this phase, being present in amounts about equal to those of the sandstone fragments. In some places the sandstone fragments predominate, small patches sometimes carrying enough to have the characteristics of a stony loam, while in other localities chert occurs as the dominant rock. The phase also comprises areas almost free of rock fragments, while the development as a whole does not carry enough fragments to interfere materially with cultivation. In the deep subsoil chert fragments are usually present, frequently in thin and thick strata, so mixed with compact, red, gray, and yellow clay as to constitute an almost impenetrable hardpanlike layer.

In general, this type is closely associated in distribution with the Clarksville gravelly loam. It is characteristically developed on the slopes of the low ridges which are so extensively occupied by the Clarksville gravelly loam. Its surface is gently to somewhat steeply sloping. A large part of the type is well suited to cultivation, but some of it is so steep that its safest utilization is for orchards and the production of soil-binding crops, such as cowpeas and grasses.

Both surface and underdrainage are well established. Rain water flows off so rapidly in places that terraces should be employed to hold the soil in place against the harmful effects of erosion.

The presence of sandstone fragments in this phase makes the origin of the soil somewhat doubtful. It is believed, however, owing to the identical character of the material and crop value of the soil with that of the typical Decatur clay loam, and the presence of a considerable quantity of chert fragments, that the soil material is largely derived from limestone, and that the sandstone fragments represent the remnants of resistant sandstone layers associated with the original limestone strata which gave rise to the bulk of the soil. The sandstone fragments may have come from layers of sandstone

which formerly overlay the limestone, or they may have been brought down from the higher slopes of Taylor Ridge to the west and buried within the soil mass by colluvial action.

The Decatur clay loam is one of the most productive residual soils in the county, being equaled only by the Hagerstown silt loam.

It is extensively used in the production of cotton, corn, and cowpeas. Under the prevailing methods of culture, cotton yields from about one-half to 1 bale and corn from 25 to 60 bushels per acre. Cowpeas produce from 1 to 2 tons of hay and heavy yields of seed. Some of the best farmers get as much as 100 bushels of corn per acre. Generally light applications, from 200 to 300 pounds per acre, of low grade fertilizers are made for important crops. Some wheat is grown on this soil with very good results. Peaches seem to do very well, but are not extensively grown on this type. Soil of this kind could be successfully used for the production of nursery stock, as it has good drainage and is favorably located for this purpose. This same soil in the vicinity of Huntsville, Ala., is successfully used for the growing of nursery stock, including apples, peaches, and ornamentals.

With such thorough cultivation as will maintain a good, pulverulent structure and with proper provision against erosion, such as well-constructed hillside ditches and terraces, better average yields should be secured than at present, without the addition of very much fertilizer. For the maintenance of the most productive condition, cowpeas or clover should be included with the general farm crops in rotations, and occasionally a full growth of one of these should be turned under to provide needed vegetable matter. Also, the land should be plowed to an average depth of at least 8 inches. The best time to break the soil is in the fall. Where this is done it would be advisable to seed the land to winter cover crops, such as small grain or vetch, particularly on the more sloping areas where washing is likely to occur.

Although commercial fertilizers at least in large amounts will not be needed where the land is properly managed according to the above suggestions, moderate applications can be made profitably, especially in those fields that have been severely cropped. A mixture analyzing about 8 per cent phosphoric acid, 3 per cent nitrogen, and 3 per cent potash has been found to give very good results on the soils in a number of localities throughout the limestone regions.

HAGERSTOWN SILT LOAM.

The soil of the Hagerstown silt loam is a brown, mellow silt loam, ranging from about 8 to 14 inches in depth. The subsoil is a reddish-yellow to yellowish-red or reddish-brown, friable silty clay loam which passes below into a silty clay of about the same color, but usually a little more compact. The type includes some areas of

typical Hagerstown loam, but these were too small and irregularly distributed to admit of separate mapping on the scale used. The occasional slight depressions generally carry a higher content of silt in the surface section and have a lighter colored or more nearly yellow subsoil. On the slight elevations where the underdrainage is better, oxidation has advanced to a greater degree than in the typical soil, with the result that the subsoil has a deeper red color. Such areas represent an approach to the characteristics of the Decatur soils. In places the Decatur and Hagerstown grade into each other in such a way that the establishment of the boundary is rather difficult.

With a content of 50 per cent or more of silt, this mellow soil breaks up readily into an excellent tilth, which can be easily maintained throughout a wide range of moisture conditions with comparatively light tools and stock. Some of the shallower, eroded areas on the slopes require heavy tools and strong teams for establishing a satisfactory seedbed.

The Hagerstown silt loam has a considerable development in the county, the most extensive areas being those in Dirttown Valley, the areas to the south, west, and southwest of Lyerly, and the long, narrow strip to the northwest of Berryton. Other smaller areas are scattered throughout the limestone valleys. The type occupies flat to undulating valley areas. Its surface is generally much more nearly level and lower lying than that of the Decatur soils.

Typically the material of this soil is derived from pure limestone which contains in most places little or no chert. Some of the lower, flat areas, however, such as those in Dirttown Valley, carry varying amounts of chert and sandstone fragments on the surface. The origin of the latter is not perfectly clear, but it is believed that they represent the remnants of sandstone strata which were interbedded, with the limestone contributing probably the major part of the material.

Both the surface and under drainage in most cases are well established. The drainage, however, is not so thorough as that of the Decatur soils, and it is not unlikely that this fact has a direct connection with the lighter color of the subsoil—that the oxidation has been retarded by the relatively poorer drainage in such a way as to prevent the complete oxidation which has given rise to the Decatur material.

The Hagerstown silt loam is naturally a strong, productive soil with an excellent adaptation to the general farm crops of the region. Practically the entire area is under cultivation to cotton, corn, cowpeas, and in a smaller way to several other crops, such as sorghum and small grain. Its crop capabilities very nearly coincide with those of the Decatur clay loam, but the type has an advantage over that

soil in that it is more easily cultivated and much less susceptible to erosion.

Wheat, rye, vetch, and Irish potatoes would give good yields, but these crops now have no important place in the general farming operations practiced on this soil.

Light applications of low-grade commercial fertilizers are used in connection with the growing of cotton and corn. By practicing deep plowing and rotations which include an occasional legume, such as cowpeas, clover, or vetch, there will be little need of using fertilizers of any kind.

This type is recognized over a wide area through the limestone valley regions from central Alabama to eastern Pennsylvania as a soil of remarkable productivity and durability. In many sections, however, moderate applications of lime are made occasionally, with good results. Light applications of complete fertilizer mixtures, as well as barnyard manure, have a recognized value in increasing crop yields of those areas in which the organic-matter content has been diminished by the continued cultivation of those crops which do not supply sufficient vegetable matter to maintain a mellow structural condition.

In the area farther north the Hagerstown silt loam is extensively used in the production of clover and timothy hay. The climatic environment of the type as here developed is not so favorable to the successful production of these crops, but with proper care clover and lespedeza can be made important hay and soil-improving crops. In the open valleys where air drainage is good, apples can be successfully grown.

COLBERT SILT LOAM.

The Colbert silt loam consists of a gray, rather compact silt loam, having a depth of about 6 to 10 inches. The subsoil is a pale-yellow, compact, silty clay loam, which grades below into a plastic, sticky, silty clay of a yellow or pale-yellow color frequently mottled with gray and shades of yellow, brown, and red. Black oxide of iron concretions occur throughout the lower subsoil, particularly in the flat, depressed areas which are not well drained.

Owing to its low organic-matter content and its high percentage of silt, the soil puddles, and with subsequent dry weather it bakes and assumes a condition unfavorable to plant growth and resistant to efficient cultivation. Naturally this soil is rather difficult to plow and requires heavy tools and stock for the establishment and maintenance of good tilth.

The Colbert silt loam occupies flat to gently undulating, low valley areas. Its topography prevents rapid surface drainage, while the impervious heavy clay subsoil retards underdrainage and aeration.

The type does not have a very extensive area in the county. The largest areas are those in Chattooga Valley, north of Summerville, at Lyerly, to the south of Chattoogaville, and the body lying east of Chelsea.

The material is derived from pure limestone, which has weathered generally to a depth of 3 feet or more so completely that rock fragments are of rare occurrence. The poor drainage condition and resulting exclusion of air has checked oxidation and weathering. This has had much to do with the light color of the soil and the compact, plastic structure of the subsoil. It is believed that with a more nearly perfect drainage system this soil would eventually weather out sufficiently to approach the characteristics of the Hagerstown, but the attainment of such a state would require long periods of time.

In its natural condition the Colbert silt loam is best suited to the production of grasses and lespedeza. By ditching, the surface drainage can be improved so as better to fit the land for other crops. Cotton is likely to mature slowly, but with the liberal addition of phosphatic fertilizers, such as acid phosphate, this tendency can be remedied. On the other hand, cotton is inclined to rust in dry seasons and corn to french in wet seasons. The best remedies for these tendencies are better drainage, deeper plowing, and the application of potash salts, such as kainit and sulphate of potash.

This soil is decidedly acid. It should be limed rather liberally to correct this unfavorable condition. Acreage applications of from 1 to 2 tons of burnt lime or twice this amount of ground limestone are recommended. Another essential in the improvement of the productive capacity of the Colbert silt loam is the turning under of vegetable matter, in which the soil is markedly deficient.

With better drainage, deep plowing, liming, the incorporation of vegetable matter, and the application of fertilizers high in phosphoric acid and potash this soil can be brought up to a higher state of productivity, permitting the profitable growing of clover, lespedeza, wheat, sorghum, cowpeas, cotton, and corn.

COLBERT SILTY CLAY LOAM.

The Colbert silty clay loam has practically the same characteristics of color, structure, and topography as the Colbert silt loam; the important difference consisting of its heavier texture or higher content of clay in the surface soil. Typically this soil consists of a gray, compact silty clay loam, underlain at a depth of about 5 to 8 inches by pale-yellow, compact, heavy silty clay loam which quickly grades below into a plastic, tenacious, yellow clay, usually mottled with gray and shades of yellow, brown, and red.

The heavy clay subsoil cracks in exposed sections on drying out in a way peculiar to all noncalcareous soils of similar structure. Black oxide of iron concretions are not uncommon on the surface and mixed with the surface soil

On account of the low organic content and silty nature of the soil this land bakes on drying out, assuming a very intractable condition, necessitating the use of heavy teams and strong plows for efficient cultivation. The working qualities of the soil are even poorer than those of the Colbert silt loam.

The type is confined to flat or very gently undulating valley lands, having poor surface drainage. The impervious nature of the subsoil prevents good underdrainage.

The type comprises a somewhat smaller area than the Colbert silt loam. The largest body extends from Fosters Store northeastwardly toward Berryton. There is a considerable area between the forks of Raccoon Creek west of Berryton and another between Hammonds Store and the northern county line.

The soil is derived from pure limestone. Weathering has taken place completely to a depth of something over 3 feet. The underlying rock, however, lies much nearer the surface than in the case of the Hagerstown and Decatur soils.

The type is adapted to the same crops as the Colbert silt loam. Its cultivation is somewhat more difficult and expensive, owing to its heavier texture and more compact structure. The same methods of management and treatment are necessary for good crop efficiency as are required by the Colbert silt loam. The proper management of this soil includes artificial drainage by tiling, the incorporation of vegetable matter to open up the soil, liberal additions of lime to correct acidity and improve the structure, deep plowing, and the application of moderate amounts of fertilizers high in phosphoric acid and potash. The crops most likely to give profitable returns on land thus treated are wheat, cowpeas, sorghum, corn, and cotton. In its natural condition the land is best suited to lespedeza and grass for grazing and for the production of hay.

COLBERT STONY CLAY.

The Colbert stony clay to a depth of 2 or 3 inches varies from silt loam to a silty clay loam, and has a grayish color. Beneath this the material prevailingly consists of a heavy, yellow clay, plastic and sticky in character, and generally mottled with gray and shades of yellow, red, and brown. The parent limestone is ordinarily encountered within less than 3 feet of the surface, while fragments and ledges of this rock are conspicuous throughout the type.

The type has a very limited development in Chattooga County. Only a few small areas were found. The most important of these

occur to the north and west of New Antioch Church and along the northern end of Dirtseller Mountain near Fosters Store.

The material represents the weathered products of limestone. The soil is too stony for profitable use. It would be difficult to plow, even if there were no rocks present. Most of the type is forested with hardwoods.

CLARKSVILLE GRAVELLY LOAM.

The Clarksville gravelly loam is a light-gray, friable silt loam, which gradually passes downward into a pale-yellow, friable heavy silt loam. The subsoil, beginning at an average depth of 10 or 12 inches, typically consists of a pale-yellow heavy silt loam to silty clay loam, having a friable or crumbly structure. This yellow material may continue to a depth of 36 inches or more, but very often it grades at about 24 inches into a yellowish-red to dull-red, brittle silty clay loam to silty clay.

In places the subsoil consists entirely of red material, this being especially true along slopes. Such areas were found to be of such small size and so intricately associated with the typical soil that their separation as a distinct type was impracticable on the scale used. Inasmuch as the agricultural value of those areas having a red subsoil is the same as that of the typical development of the type, so far as is indicated by crops, it seemed doubtful as to whether their recognition as a separate soil would be of any practical value. The substratum seems to be red instead of yellow in most instances, but it frequently has a mottled red, yellow, and white color.

Angular fragments of gray, white, and reddish chert, varying from minute particles to pieces several inches in diameter, are everywhere present over the surface and throughout the soil and subsoil in quantities sufficient to give the material a very gravelly nature, interfering with cultivation and making it almost impossible to bore to any considerable depth with a soil auger. On some of the steeper slopes the fragments are larger, giving the soil the character of a stony loam. Deep plowing is at all times difficult, and when the soil has dried out, plowing of any kind becomes extremely so.

Frequently constituting as much as 50 per cent of the soil mass, the chert necessarily imparts to the soil a porous nature, resulting in perfect underdrainage and aeration. The fragments assist in holding the soil in place, and this, coupled with the rapid absorption and downward movement of rain water, prevents serious erosion, even on the steepest slopes.

This is the most extensive type of soil in Chattooga County. It occupies 35 per cent of the total land area. It occurs in wide and narrow parallel ridges or belts of rounded hills crossing the county in a northeast and southwest direction. The crests of these ridges and

hills range upward to about 300 feet above the level of the intervening valleys. The slopes vary from moderately steep to sharp. A considerable total area is too steep to admit of any kind of cultivation, but the greater part of the type can be plowed and successfully used either for cultivated crops or fruits. In the case of the less gravelly and more close structured soils, such cultivation as is practiced successfully on a large part of the Clarksville gravelly loam would result in disastrous washing and gullying of the surface.

The Clarksville gravelly loam is derived from cherty limestone, belonging mainly to the Knox dolomite, Fort Payne chert, and Armuchee chert formation.

It is estimated that 30 to 40 per cent of the type is under cultivation. Probably 75 per cent or more could be used either in the production of general farm crops or fruit, the remainder being too steep and rough, and too inaccessible for profitable farming purposes under existing conditions.

The type is extensively used in the production of cotton, corn, cowpeas, and peaches. The results secured are remarkably good, considering the extremely gravelly nature, the rough topography, and the unfavorable, lifeless appearance of the light-gray soil. The inherent productiveness of the soil is undoubtedly due to its origin from limestone, resulting in a lime content sufficiently high to maintain a condition favorable to healthful plant growth.

Cotton yields from about one-fourth to one-half bale and corn about 15 to 35 or 40 bushels per acre, with light applications of low-grade commercial fertilizers. Cowpeas incline to fruit heavily on this soil, indicating that the soil could be profitably used for the production of cowpeas for seed. Among some of the lower slopes small, scattered areas of the Clarksville gravelly loam have a smoother surface and a lower content of chert fragments. Land of this character is much more easily cultivated than the rougher, more gravelly areas and in consequence yields from 10 to 15 per cent more than the average of the type.

Crops withstand drought exceptionally well for a soil having such thorough surface and under drainage, this being particularly true where the land is well supplied with vegetable matter.

This is one of the best soils of the region for the production of peaches. Large orchards are being operated successfully in the vicinity of Summerville and Lyerly. The Carmen and Elberta are the varieties commonly grown.

This soil also has a well-established reputation over an extensive area in Tennessee, Georgia, and Alabama as a good producer of Irish potatoes and strawberries. Tomatoes and cantaloupes also do well. There is no reason why there should not be a wide extension

of trucking industries, including the production of the above crops, on the Clarksville gravelly loam.

In building up the productivity of the Clarksville gravelly loam, one of the most important requisites is the provision of organic matter, such as can be advantageously supplied by plowing under an occasional crop of cowpeas, clover, vetch, or rye. With a higher content of organic matter the land holds moisture better and crops are thus made less susceptible to the effects of droughts.

Moderate applications of complete fertilizer mixtures may be expected to give profitable returns with crops like cotton, corn, and vegetables. About 300 to 500 pounds per acre of a mixture analyzing 8 per cent phosphoric acid, 3 to 4 per cent nitrogen, and 4 per cent potash, should result in yields of about three-fourths of a bale of cotton and from 40 to 60 bushels of corn per acre. For vegetables it is probable that a high percentage of potash will be found essential.

The price of land of this kind ranges from about $10 to $30 an acre, according to location and topography. Land set out in orchards of course can not be bought so cheaply.

HUNTINGTON SILT LOAM.

The Huntington silt loam is a light-brown to brown, mellow loam, underlain at about 8 to 12 inches by a silty clay loam having about the same characteristics of the soil. The type includes a considerable number of variations from the typical. Along the smaller streams the color and texture are less uniform than in the broad bottoms of the Chattooga River. In such situations the character of the land has been affected by the wash from adjacent slopes. In the bottoms of those streams issuing from and traversing areas of red soils, such as the Decatur and Hanceville, the soil is generally of a reddish-brown or chocolate color. There are many places near the foot of ridges and mountains where gravel and angular fragments of chert, sandstone, and shale are intermingled with the alluvial material often in amounts sufficient to give the soil a gravelly character. In places small gravelly alluvial fans have been spread out along the foot of slopes, the material having been washed down by streams, which in times of heavy rainfall are capable of moving stones 5 or 6 inches in diameter. These gravelly areas would have been mapped as Huntington gravelly loam had they been of sufficient size.

Nearly every stream in the county of any size is fringed with strips of this soil. The largest streams naturally have the widest flood plains, and here the material is more uniform in texture. The largest areas are developed in the bottoms of Chattooga River, and Teloga, Raccoon, East Armuchee, and West Armuchee Creeks.

The Huntington silt loam is an alluvial soil, made up of material washed from the various soils occurring in the drainage basins of the streams along which it is developed, and deposited during overflows. The bulk of the material is derived from the Dekalb, Hanceville, Decatur, Hagerstown, and Conasauga soils. With each successive overflow, additional sediments are laid down.

The soil is very productive and durable, and is admirably adapted to corn, grass, cowpeas, and sorghum. Under favorable conditions, the best areas of the type will produce upward of 75 bushels of corn per acre, 2 tons of cowpea hay, and heavy yields of mixed sorghum and cowpea hay. Redtop, lespedeza, and a number of wild grasses including "water grass," such as *Paspalum dilatatum*, afford good grazing and can be profitably cut for hay.

Among the crops giving good results on this soil are Irish potatoes, cabbage, and tomatoes. Cotton is grown in a small way, but it tends to produce too much weed at the expense of fruiting and is slow to mature. It is possible that applications of phosphatic fertilizers would hasten the maturity of the crop and thus bring about better yields.

The soil is usually acid. Acreage applications of about 1 ton of burnt lime or 2 tons of ground limestone are recommended. Such an application would be sufficient for several years. One of the greatest disadvantages is the liability of the type to be overflowed at any season. Some of the flatter or more depressed areas need ditching to facilitate drainage. With proper soil preparation and applications of lime, little or no fertilizer would be required to maintain good yields on this land.

SUMMARY.

Chattooga County lies in the northwestern part of Georgia and comprises an area of about 312 square miles, or 199,680 acres. It embraces three main physiographic divisions: (1) the Cumberland Plateau, (2) the Appalachian Valleys, and (3) the Appalachian Ridges.

The Cumberland Plateau, represented by Lookout Mountain, crosses the northwestern corner of the county. It is bounded on the east by a steep escarpment, but the summit is flat to gently rolling.

The Appalachian Valley division is represented by a series of flat, undulating to gently rolling valleys, such as the Chattooga, Dirttown, and Broomtown Valleys, which extend across the county in a general northeast to southwest direction. This division also includes a series of low chert ridges and rounded hills.

The Appalachian Ridge group is represented by a series of high ridges which are in a general way parallel, having a general northeast to southwest course. The summits of these ridges vary from 1,000 to about 1,500 feet above sea level and from 500 to about 800 feet above the level of the valleys.

Central Chattooga County is drained by the Chattooga River and its many small tributaries. The region east of Taylor Ridge is drained by East Armuchee and West Armuchee Creeks, and the northwestern corner of the county by the Little River.

Chattooga was formed from parts of Floyd and Walker Counties in 1838. The greater part of the population consists of descendants of the early settlers of this region.

The principal towns are Summerville, the county seat, Trion, a manufacturing town, and Lyerly, all of which are situated on the Central of Georgia Railway. Menlo is the principal town in the western part of the county. The valleys are comparatively thickly settled, but the population of the higher mountainous districts is very sparse.

The central part of the county is traversed by the Central of Georgia Railway. The Tennessee, Alabama & Georgia Railroad crosses the western part of the area. The Rome & Northern Railroad traverses the east-central part of the county.

The farm products not sold at local markets are mainly shipped to Rome, Ga. The peaches grown in the area are shipped in carload lots to the large northern markets.

The climate of the area is characterized by mild, short winters and moderately warm summers. The climatic conditions are well adapted to the production of a great diversity of crops, and the growing season is usually about six months long.

The early agriculture of the county consisted principally of the production of corn and small grain crops, chiefly wheat. Cotton is at present the principal agricultural product, though a larger acreage is devoted to corn. Cotton is successfully grown on every type of agricultural land in the county.

Wheat, oats, rye, potatoes, and sorghum are grown to a limited extent. In some localities the growing of strawberries is also an industry of considerable importance.

Peaches are grown extensively on the gravelly ridges and on some of the soils occupying the low mountains. The crop is grown for shipment to the northern markets, the Carmen and Alberta being the common varieties.

Stock raising and dairying should be encouraged in the county. The dairy stock is of high grade, but this branch of agriculture has not been developed to any great extent.

Twenty-one types of soil, including Rough stony land, were encountered in the survey. The principal upland soils are entirely residual, with the exception of small patches modified by colluvial material. The bottom land soils represent alluvial material deposited by the waters of the streams at times of overflow. The rocks forming the upland soils are all sedimentary in origin.

The Conasauga series is represented by the Conasauga silt loam, which is a light-brown silt loam, underlain by a yellow silty clay. The soil is derived from a shale and occupies flat valley lands.

The soils of the Armuchee series are derived from shale and thin strata of sandstone. They consist of brownish to red surface soils, underlain by red to reddish-brown clay loams or clay. The Armuchee silt loam, clay loam, and loam occur in the county, occupying flat to gently rolling valley lands. They are well adapted to the production of general farm crops.

The Shackelton series, represented by two types, a silt loam and gravelly loam, also occurs in the valleys and on low ridges. These soils are derived from the Floyd formation, but have gray surface soils and yellow subsoils. The soils are well adapted to cotton, corn, and general farm crops.

The soils of the Dekalb and Hanceville series occupy the mountains and high ridges. The stony loam types are of little or no agricultural value, but the silt loam, clay loam, and fine sandy loam types are successfully used for agriculture. These soils are derived from sandstones and shales.

The Clarksville series is represented by the Clarksville gravelly loam. This type occupies low cherty ridges. It is especially adapted to the growing of peaches and also produces profitable yields of the general farm crops.

The Montevallo shale loam is of limited extent and of small agricultural value.

The Hagerstown silt loam is one of the most productive soils in the county. It is a light-brown silt loam underlain by a reddish-brown silty clay. The soil is derived from limestone. It is well adapted to cotton, corn, and other general farm crops.

The Decatur clay loam is also derived from limestone. It is a red to reddish-brown clay loam underlain by a friable red clay. It occupies gently rolling valley lands and is well adapted to all crops grown in the county.

The Colbert series includes three types—the stony clay, silty clay loam, and silt loam. These soils have a light-brown to gray surface soil underlain by a stiff, impervious yellow clay. They are derived from limestones. The stony clay is of little or no agricultural value. The silty clay loam and silt loam are used for general farming purposes, but produce only poor to fair yields.

The alluvial bottom lands are occupied by the Huntington silt loam. This is a productive soil, but the crops grown are frequently damaged by floods.

○

[PUBLIC RESOLUTION—No. 9.]

JOINT RESOLUTION Amending public resolution numbered eight, Fifty-sixth Congress, second session, approved February twenty-third, nineteen hundred and one, "providing for the printing annually of the report on field operations of the Division of Soils, Department of Agriculture."

Resolved by the Senate and House of Representatives of the United States of America in Congress assembled, That public resolution numbered eight, Fifty-sixth Congress, second session, approved February twenty-third, nineteen hundred and one, be amended by striking out all after the resolving clause and inserting in lieu thereof the following:

That there shall be printed ten thousand five hundred copies of the report on field operations of the Division of Soils, Department of Agriculture, of which one thousand five hundred copies shall be for the use of the Senate, three thousand copies for the use of the House of Representatives, and six thousand copies for the use of the Department of Agriculture: *Provided,* That in addition to the number of copies above provided for there shall be printed, as soon as the manuscript can be prepared, with the necessary maps and illustrations to accompany it, a report on each area surveyed, in the form of advance sheets, bound in paper covers, of which five hundred copies shall be for the use of each Senator from the State, two thousand copies for the use of each Representative for the Congressional district or districts in which the survey is made, and one thousand copies for the use of the Department of Agriculture.

Approved March 14, 1904.

[On July 1, 1901, the Division of Soils was reorganized as the Bureau of Soils.]

NRCS Accessibility Statement

This document is not accessible by screen-reader software. The Natural Resources Conservation Service (NRCS) is committed to making its information accessible to all of its customers and employees. If you are experiencing accessibility issues and need assistance, please contact our Helpdesk by phone at 1-800-457-3642 or by e-mail at ServiceDesk-FTC@ftc.usda.gov. For assistance with publications that include maps, graphs, or similar forms of information, you may also wish to contact our State or local office. You can locate the correct office and phone number at http://offices.sc.egov.usda.gov/locator/app.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

U. S. DEPT. OF AGRICULTURE
BUREAU OF SOILS
MILTON WHITNEY, CHIEF
CURTIS F. MARBUT, IN CHARGE SOIL SURVEY

SOIL MAP
GEORGIA
CHATTOOGA COUNTY SHEET

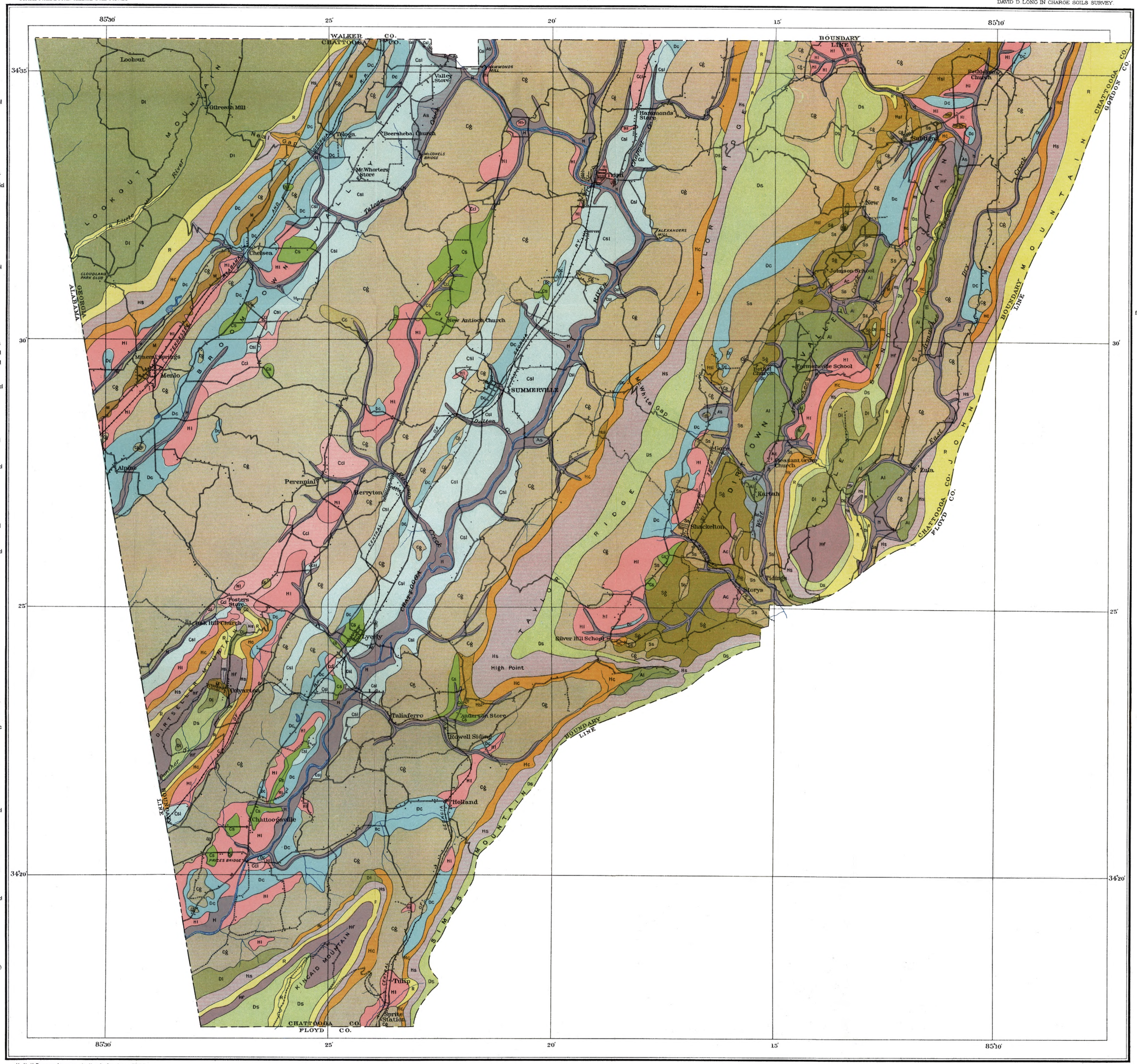
GEORGIA STATE COLLEGE OF AGRICULTURE
ANDREW M. SOULE, PRESIDENT
DAVID D. LONG IN CHARGE SOILS SURVEY

SOIL PROFILE
(3 feet deep)

- Dekalb stony loam — L / Sic / R(Sh&S)
- Colbert silt loam — Sil / C
- Dekalb fine sandy loam — Fsl / Fsc
- Colbert silty clay loam — Sicl / C
- Hanceville stony loam — L / C / R(Sh&S)
- Colbert stony clay — Sil / C / R(L)
- Hanceville fine sandy loam — Fsl / Fsc
- Shackelton gravelly loam — Sil / Sil / Sicl
- Hanceville silt loam — Sil / C
- Shackelton silt loam — Sil / Sicl
- Hanceville clay loam — Cl / C
- Conasauga silt loam — Sil / Sicl / Sic
- Armuchee loam — L / C
- Decatur clay loam — Cl / C
- Armuchee silt loam — Sil / C
- Hagerstown silt loam — Sil / Sic
- Armuchee clay loam — Cl / C
- Huntington silt loam — Sil / Sicl
- Montevallo shale loam — Sil / Sic / R(Sh)
- Clarksville gravelly loam — Sil / Sicl

LEGEND

L Loam
Sic Silty clay
R(Sh&S) Rock (Shale and sandstone)
Fsl Fine sandy loam
Fsc Fine sandy clay
C Clay
Sil Silt loam
Cl Clay loam
R(Sh) Rock (Shale)
Sicl Silty clay loam
R(L) Rock (Limestone)



LEGEND

- Dekalb stony loam — Ds
- Colbert silt loam — Cs
- Dekalb fine sandy loam — Dl
- Colbert silty clay loam — Ccl
- Hanceville stony loam — Hs
- Colbert stony clay — Cc
- Hanceville fine sandy loam — Hf
- Shackelton gravelly loam — Sg
- Hanceville silt loam — Hsl
- Shackelton silt loam — Ss
- Hanceville clay loam — Hc
- Conasauga silt loam — Csl
- Armuchee loam — Al
- Decatur clay loam — Dc
- Armuchee silt loam — As
- Hagerstown silt loam — Hl
- Armuchee clay loam — Ac
- Huntington silt loam — H
- Montevallo shale loam — M
- Clarksville gravelly loam — Cg
- Rough stony land — R

Hugh H. Bennett, Inspector in Charge Southern Division
Soils surveyed by A.W. Mangum of the U.S. Department of Agriculture and David D. Long of the Georgia State College of Agriculture

1 ½ 0 1 2 3 4 Miles
Scale 1 inch = 1 mile

JULIUS BIEN CO. N.Y.

Field Operations
Bureau of Soils
1912